

CORRESPONDENCE
OUTGOING LTR #

DOE ORDER #

05-RF-00937

DIST LTR ENC

CROCKETT, G		
FERRERA, D.W.		
GILPIN, H.E.		
LONG, J.W.		
LINDSAY, D. C.		
SHELTON, D.C.		
TUOR, N.R.		
SNYDER, D		
PLAPPERT, R. D.		
GILLESPIE, D. R.		
NESTA, S.		
WIEMELT, K	X	X
PRIMROSE, A	X	X

October 10, 2005

05-RF-00937

Mr. John J. Rampe
Project Management Division
DOE, RFPO

Mr. Carl Spreng
Colorado Department of Public Health and Environment
4300 Cherry Creek Drive South
Denver, CO 80246-1502

Mr. Mark Aguilar
U.S. Environmental Protection Agency
999 18th Street, Suite 300
Denver, CO 80202-2466

TRANSMITTAL OF THE WHITE PAPER RESULTS OF GROUNDWATER INTERIM
MEASURE/INTERIM REMEDIAL ACTION – 903 PAD VOLATILE ORGANIC COMPOUND
INVESTIGATION – KLV-059-05

CORRESPONDENCE	X	X
PATS		
ADMIN. RECORD	X	X
WASTE REC CTR		
TRAFFIC		

Enclosed are copies of the transmittal of the white paper results of groundwater interim
measure/interim remedial action – 903 Pad volatile organic compound investigation.

If you have any question, please contact Annette Primrose at 303-994-2761.

CLASSIFICATION:	
UCNI	
UNCLASSIFIED	
CONFIDENTIAL	
SECRET	

AUTHORIZED CLASSIFIER
SIGNATURE:

Karen L. Wiemelt
Karen L. Wiemelt
ER Program Manager
Remediation, Industrial D&D, and Site Services

Exemption - CEX-105-01

Date:

IN REPLY TO RFP CC #:

ALP:rlm

ACTION ITEM STATUS:

☐ PARTIAL/OPEN
☐ CLOSED

Enclosure:
As Stated

LTR APPROVALS:

(Last Name)

(Last Name)

Original and 1 cc – Mr. John J. Rampe

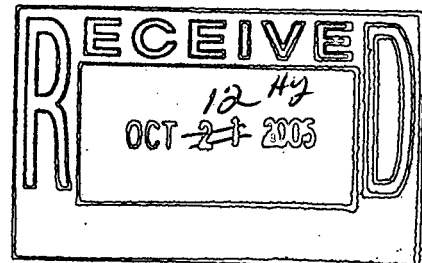
CC:

ORIG. & TYPIST INITIALS:

SMN:rlm

Norma Castaneda

Letter # KLV-059-05



ADMIN RECORD

Kaiser-Hill Company, L L C

Rocky Flats Environmental Technology Site, 10808 Hwy. 93 Unit B, Golden CO 80403-8200 303-966-7000

BZ-A-000867

White Paper

Results of Groundwater IM/IRA - 903 Pad VOC Investigation

In March 2005, soil sampling was conducted in the 903 Pad area (Individual Hazardous Substance Site 112) at Rocky Flats Environmental Technology Site (RFETS) near Golden, Colorado. This sampling was performed in support of the Sitewide Groundwater Interim Measure/Interim Remedial Action (Groundwater IM/IRA) Decision Document (Department of Energy [DOE] 2005a) to identify the location and size of any remaining significant volatile organic compound (VOC) source areas, if present, underlying the 903 Pad area. The project also better defined the bedrock surface in this area.

Background

The 903 Pad area was used to store drums that contained radioactively contaminated oils (primarily plutonium and americium) and VOCs from 1958 to 1967. The liquid in the drums was primarily lathe coolant and/or carbon tetrachloride. However, hydraulic oils, vacuum pump oils, trichloroethene, tetrachloroethene, silicone oils, acetone still bottoms, and other liquids were also stored in these drums. When leaking drums were noted in 1964, the contents of the leaking drums were transferred to new drums. The drums were removed from the area. Cleanup efforts began in 1967 and consisted of removal of some contaminated surface soils, covering the area with clean soil and installing an approximately 6-8 inch asphalt pad covering the entire 3.4 acre area (DOE 2000). The 903 Lip area is an area of surface contamination that was caused by high winds and rain that spread radiologically contaminated soils from the 903 Pad.

An accelerated action to remove radiologically contaminated soils at the 903 Pad, including asphalt and fill material from past cleanup actions, was completed in 2003. 20,213 cubic yards of radiologically contaminated soil was removed from the 903 Pad area including 12,909 cubic yards of mixed radiological and VOC-contaminated soil. The soil removal depths generally ranged from 1 to 4 feet below the surface for the 903 Pad, though some areas were excavated 4 to 6 feet deep (Figure 1). An accelerated action to remove radiologically contaminated soils the 903 Pad Lip Area was completed in 2004 with removal of 49,800 cubic yards of contaminated soil including 550 cubic yards of mixed radiological and VOC-contaminated soil.

While near surface VOC contaminated soils were removed as part of the accelerated action, actions to address deeper VOC contaminated soils, with the potential to contribute to groundwater contamination in and near this area, was deferred to the Groundwater IM/IRA.

The 903 Pad area presently consists of artificial fill and Rocky Flats Alluvium underlain by the Arapahoe formation. Artificial fill was used to backfill the excavations after the soil removal accelerated action and can be greater than four feet thick in some areas. Under the fill material is the Rocky Flats Alluvium, which is about 15 to 25 feet thick in the area of the 903 Pad and composed of poorly stratified and poorly sorted gravel (Knepper, 2005). Underlying that is the Arapahoe Formation composed of claystone and silty claystone with some lenticular sandstones (EG&G, 1995). Shallow groundwater in this area occurs primarily in the Rocky Flats Alluvium, subcropping lenticular sandstones (Arapahoe No. 1 Sandstone) and the weathered claystone. The average depth to water beneath the 903 Pad is approximately 19 feet but can vary from 7 to 22 feet deep.

Investigation Approach

Five areas where VOC-contaminated soils were potentially present at depth were identified using historical borehole and soil gas data (Figure 2). In addition, the VOC data collected for the soil removed and disposed of as waste during the accelerated action was utilized to indicate areas where VOC contamination concentrations in soil were previously high. For example, soil with tetrachloroethene concentrations over 100,000 micrograms/kilogram (ug/kg) was removed during the remedial action. In this area, higher concentrations of VOCs potentially may be present in the soil or dense non-aqueous phase liquids (DNAPLs) may have migrated downward and be present at depth.

The investigation was conducted as described in the Sampling and Analysis Plan Addendum developed for the 903 Pad VOCs (DOE 2005b). Twenty-five locations were sampled to bedrock within the five areas with the highest potential for residual VOCs (Figure 1). Figure 2 shows the target areas as well as the previous subsurface sample results.

Seventeen locations were drilled to bedrock with the Geoprobe®. The other eight were drilled with a dual-wall, reverse-circulation percussion drill rig. All boreholes were logged and the logs are included in Appendix A.

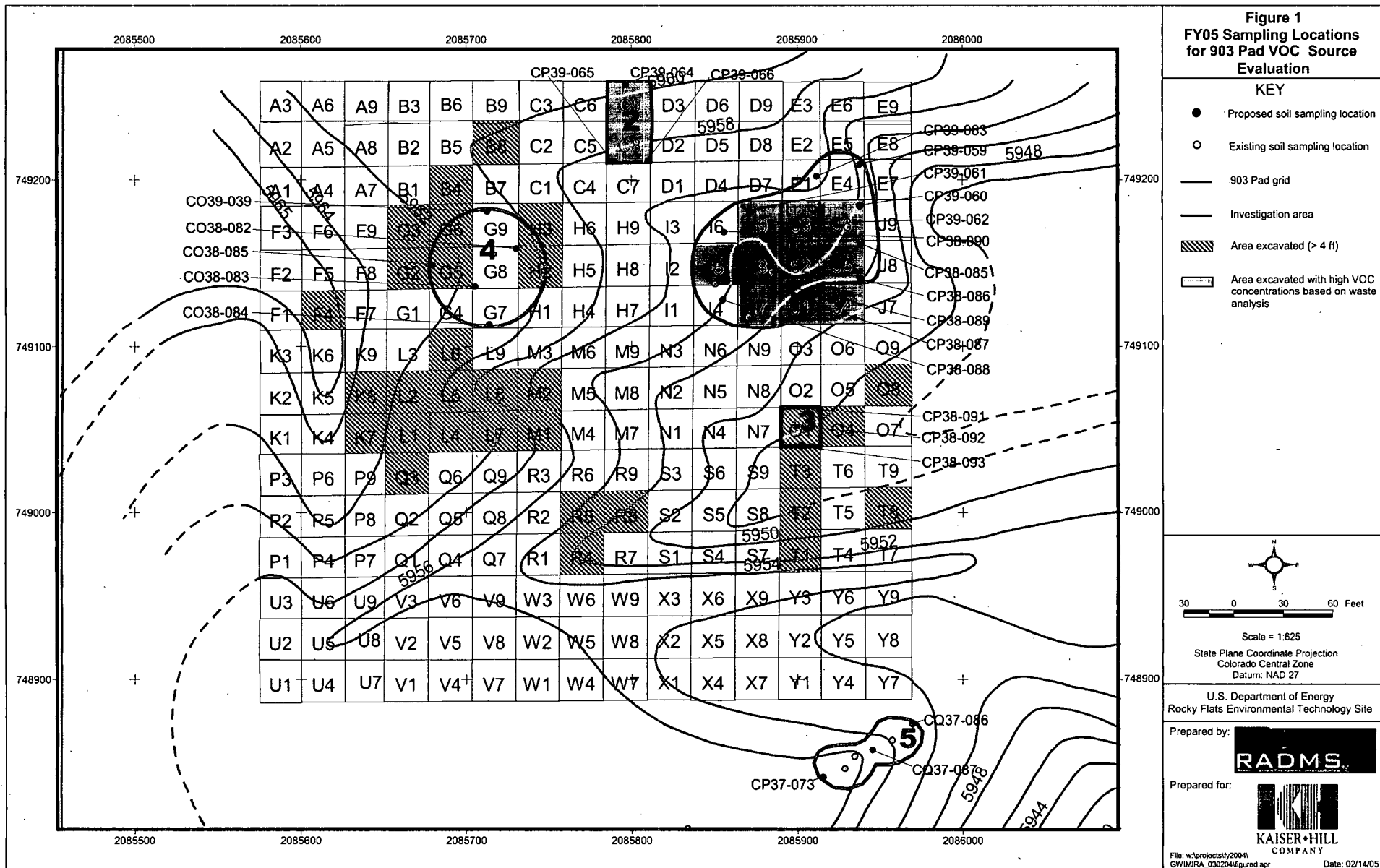
Samples were collected and analyzed from all intervals between the bottom of the fill from the previous soil removal to six feet below surface. The upper sampling intervals are generally between 4 feet (bottom of the fill) to 10 feet deep (6 feet below the fill) in accordance to the Sampling and Analysis Plan (DOE 2005b). Intervals from 6 ft to bedrock were cored and visually inspected for staining or other signs of contamination and screened with a photo-ionization detector (PID). VOC samples were collected and analyzed from core intervals where there were stained soils or elevated PID readings. In addition, VOC samples were collected immediately above and immediately below the bedrock surface. A total of 124 samples were collected and analyzed using Environmental Protection Agency Method 8260.

Geologic Setting

The investigation results were consistent with past investigations. In the 903 Pad area, fill material was generally three to four feet thick. In the 903 Lip Area (Area 5), fill material was approximately one foot thick. Alluvium and some colluvium were encountered beneath the fill material and ranged from 11 to 23 feet thick. The alluvium consisted of clayey gravel with varying amounts of sand. Clay was more predominant in some areas, particularly in the northern part of Area 1 where gravelly and sandy clays are 11 to 14 feet below the surface.

The top of bedrock was encountered at depths ranging from 14 to 28 feet below the current ground surface. The bedrock at most locations was claystone; however, Arapahoe sandstone was encountered on the north side of Area 1, the southeast corner of Area 3, and at Area 5. The bedrock surface map was revised to reflect these additional 25 locations and is provided below (Figure 3).

The bedrock surface confirms the presence of paleoscour in the bedrock across the center of the 903 Pad area and extending to the east. This directs groundwater flow to the east. Groundwater flow modeling concludes that most groundwater flow is to the east (DOE 2005a). A conceptual cross-section showing the paleoscour and other geologic features is presented in Figure 4.



KEY

Existing soil sampling location with VOC concentrations > RWV ALs (only concentrations greater than mdr)

Existing soil sampling location (all VOC concentrations less than mdr)

903 Pad grid


Investigation area

Area excavated with high VOC concentrations based on waste analysis

— Bedrock contour
- - - Inferred bedrock contour

nd -- method detection limit
g/kg -- micrograms per kilogram

C/g -- picocuries per gram
-- reporting limit
-- sample beginning depth

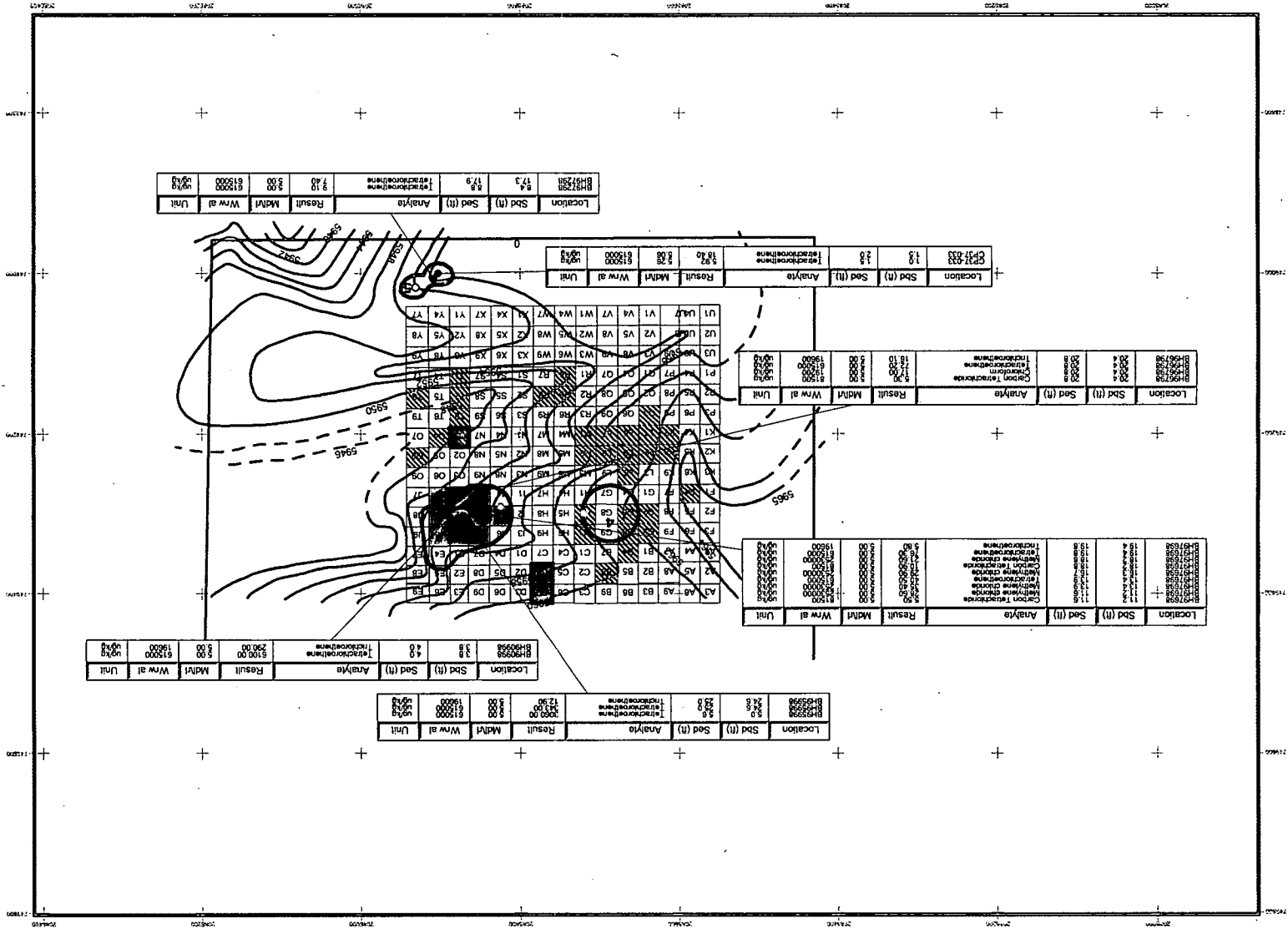


Scale = 1:1,500
State Plane Coordinate Projection
Colorado Central Zone
Datum: NAD 83

U.S. Department of Energy
Rocky Flats Environmental Technology Site

RADMS

COMPANY
w:\projects\2004\1MIRA_030204\figured.apr
Date: 01/25/05



5

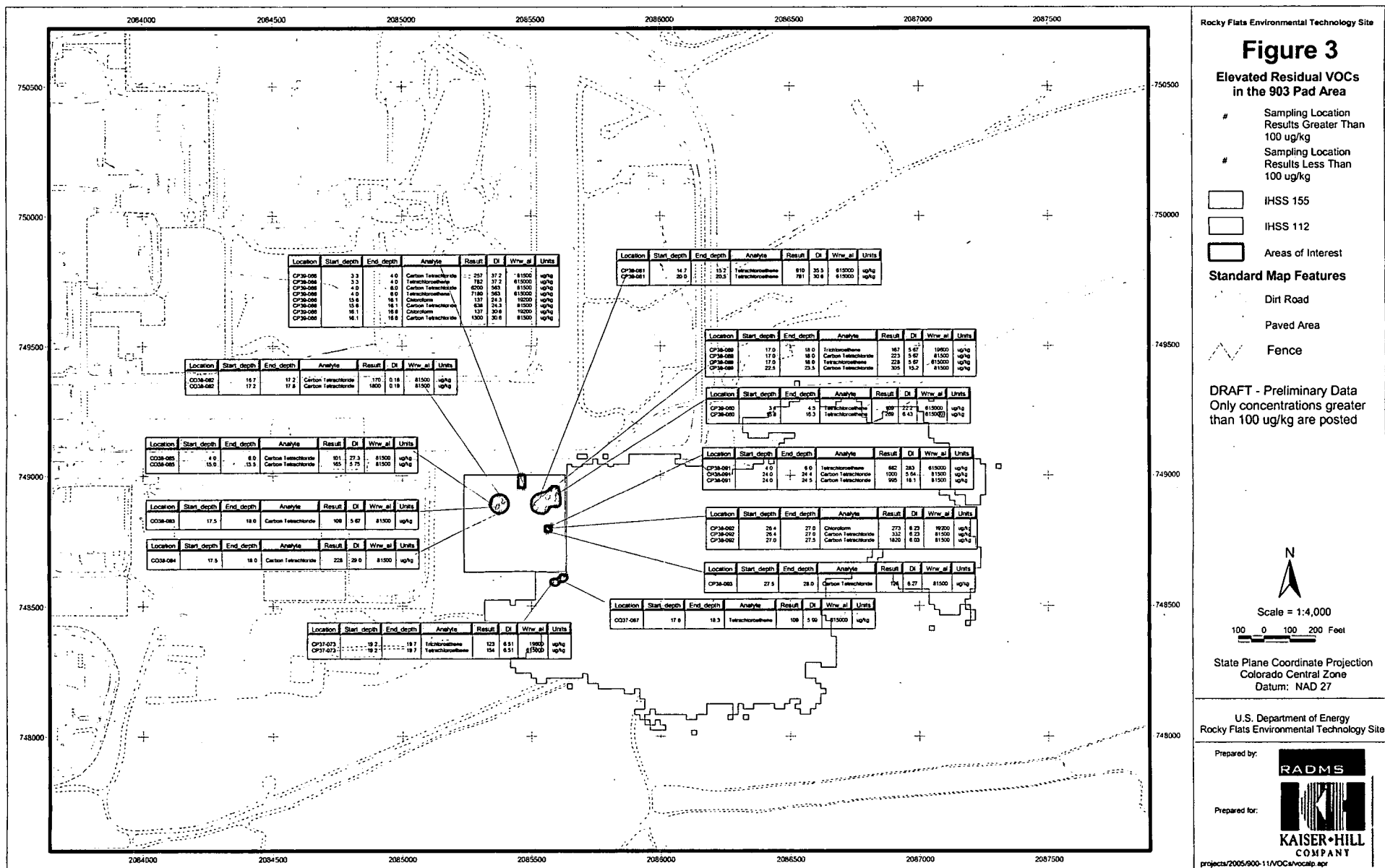
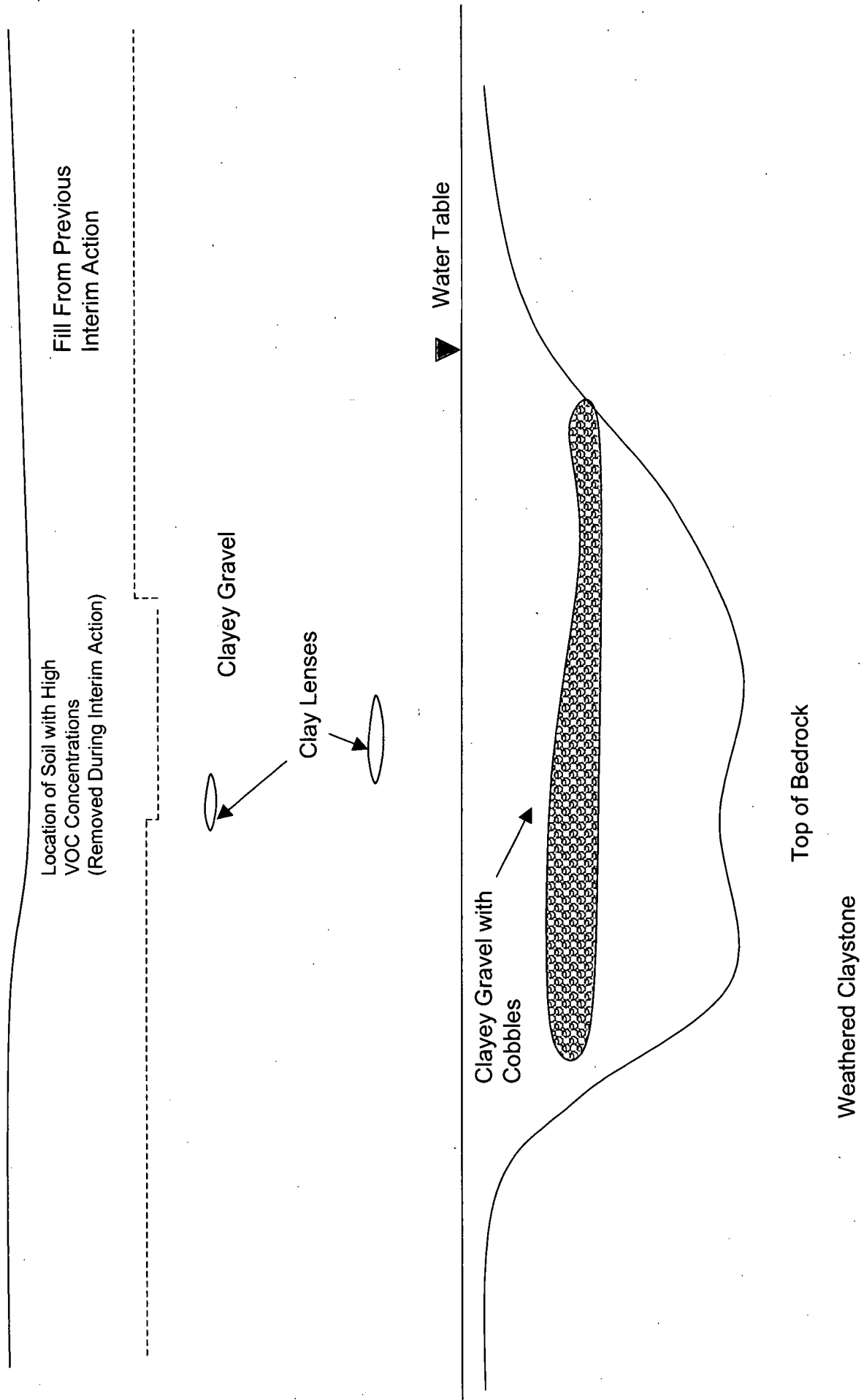


Figure 4 Conceptual Cross-Section of 903 Pad



At the northeast corner of the Pad, the Arapahoe Sandstone appears to direct a small portion of groundwater flow to the north and northeast. The groundwater flow model indicates that there is a flow divide in that area and that water in the Arapahoe sandstone probably flows both north towards the Mound Plume Treatment System and northeast towards the East Trenches Plume Treatment System.

Analytical Data

The predominant VOCs detected in all the sampling events were tetrachloroethene and carbon tetrachloride. As shown on Figure 3, the highest concentrations, 6,200 ug/kg carbon tetrachloride and 7,180 ug/kg tetrachloroethene, were found at location CP39-066 at a relatively shallow depth (4-6 feet below ground surface). Trichloroethene and chloroform were also detected with the highest concentrations at 167 ug/kg and 273 ug/kg, respectively. No other VOCs were above 100 ug/kg. Because very few of the VOCs were detected above 100 ug/kg (less than 12% of the results), 100 ug/kg was used as an indicator of areas where higher VOCs were present. The detected VOC concentrations and the Wildlife Refuge Worker Soil Action Levels are shown in Table 1.

Many of the analytes detected below 100 ug/kg are degradation products of tetrachloroethene and carbon tetrachloride. These include cis 1,2-dichloroethene, methylene chloride, trichloroethene, and chloroform. Although these may have been part of the original release, they are also very common degradation products. Other VOCs detected such as acetone, naphthalene, trichlorobenzene, toluene, and styrene were probably part of the original release, but likely made up a minor portion of the release. Low levels of methylene chloride, and 2-butanone are most likely a result of cross contamination at the laboratory since they are common laboratory contaminants. As shown in Table 1, many of the analytes detected at lower concentrations were found in the laboratory blanks.

Investigation Results

Based on the results of this investigation and previous investigations, most of the residual VOCs are in the upper part of the vadose zone (the zone of unsaturated soil above the water table). The highest VOC (tetrachloroethene) concentration found in this area was over 100,000 ug/kg in soil that was excavated during the accelerated action. The highest concentration of any VOC below ten feet was carbon tetrachloride at a concentration of 1,820 ug/kg, although most locations were significantly lower. VOC concentrations at the bedrock surface, where Dense Non-Aqueous Phase Liquid (DNAPL) would be expected, range from 0.11 to 1820 ug/kg. The absence of significant VOC concentrations in soil samples taken from the top of bedrock suggest that if DNAPL is present, its areal extent is very limited and does not warrant an accelerated action. Based on VOC concentration and areal extent, the significant VOC sources were in the upper 6 feet below ground surface and were removed during the previous accelerated actions.

At locations where significant DNAPL was found below the water table:

- Soil contamination was mostly below the water table where it could act as a continuing source of groundwater contamination.
- Only residual soil contamination in these areas was found in the vadose zone, in small areas where the release occurred.
- Very high VOC concentrations in soil or DNAPL were found beneath and/or downgradient of the release at the contact with low permeability materials, such as claystone, where the DNAPL tended to pool in low spots.

At RFETS, DNAPL was found at both Individual Hazardous Substance Site (IHSS) 118.1- Carbon Tetrachloride Spill and IHSS 153 – Oil Burn Pit #2 where pools of DNAPL were found on the top of the bedrock claystone surface. At the 903 Pad, the high concentrations of VOCs were found in the upper six feet of soil and very low VOC concentrations were found below the water table. Soils directly below the very highest contaminant concentrations did not contain significant concentrations, either below the water table, or at the top of the claystone surface, indicating that significant DNAPL is not present at the 903 Pad.

Conclusions

The majority of the VOC contaminated soils that potentially could act as a continuing source of groundwater contamination were removed during 903 Pad accelerated action. Based on the investigation results, there is no evidence that a significant VOC source area remains and therefore, an accelerated action, including additional soil removal, is not required. However, as described in the Sitewide Groundwater IM/IRA (DOE 2005a), residual soil contamination will be addressed using enhanced biodegradation to improve the groundwater quality in this area.

Given the geology and history of the 903 Pad area, there are a number of possible reasons why the higher contaminant concentrations of VOCs might remain close to the surface where they were spilled.

- The releases were a result of small sources spread out over a large area. No more than 55 gallons of fluid could be released from any given drum at any time. Because the release was spread out over a large area, most could be adsorbed onto the soil before reaching the water table.
- The releases likely occurred over time from small leaks as the drums corroded, rather than from catastrophic drum failure. This allowed the VOCs to slowly adsorb into the near surface soils rather than penetrating deeper. The VOCs were mixed with other less-dense organic liquids such as coolants, hydraulic oil, and cutting oils, that may have further slowed migration. In contrast, the DNAPL at IHSS 118.1 occurred because of large volumes of carbon tetrachloride were released quickly at a single location.
- Clay and caliche layers likely restricted downward migration. The alluvium present has a high proportion of clay, and clay lenses were encountered beneath Area 1 where the highest VOC concentrations were found during the 903 Pad remediation.
- The asphalt cover placed over the 903 Pad reduced the percolation of groundwater through the contaminated soils, minimizing downward migration of contaminants.

Enhancement of Groundwater Quality at the 903 Pad

Because residual VOC is present after completion of previous source removal action, *in-situ* biodegradation was initiated to further enhance groundwater quality at the 903 Pad. An amendment was inserted in three arcs across the major downgradient contaminated groundwater flow path. The amendment was inserted into the subsurface through Geoprobe holes and boreholes that were placed at regularly spaced intervals across the flow path through the potentially contaminated intervals. The placement of the amendment is documented in a contact record that includes a map of the insertion points (Appendix B).

References

EG&G, 1995, Groundwater Geochemistry Report for the Rocky Flats Environmental Technology Site, Final Report, Vol. III of the Sitewide Geoscience Characterization Study, Rocky Flats, Golden, Colorado

DOE, 2000, Characterization Report for the 903 Drum Storage Area, 903 Lip Area and Americium Zone, RF/RMRS-99-427.UN, Rev. 1, Rocky Flats Environmental Technology Site, Golden, Colorado, June.

DOE, 2005a, Interim Measure/Interim Remedial Action for Groundwater at the Rocky Flats Environmental Technology Site, Rocky Flats Environmental Technology Site, Golden, Colorado, June

DOE, 2005b, Industrial Area and Buffer Zone Sampling and Analysis Plan, Addendum #IABZ-05-02, 903 Pad, Volatile Organic Compounds, Rocky Flats Environmental Technology Site, Golden, Colorado, March

Knepper, D. A., 2005, Bedrock Erosion Surface Beneath the Rocky Flats Alluvial Fan, Jefferson and Boulder Counties, Colorado, the Mountain Geologist, Volume 42, Number 1, Rocky Mountain Association of Geologists, Denver, Colorado, January.

Table 1 Analytical Results of VOC Sampling at the 903 Pad

Location Code	Start Depth (Feet)	End Depth (Feet)	Analyte	Result (ug/kg)	Wildlife Refuge Worker Soil Action Level (ug/kg)	Lab Result Qualifier Codes	Validation Qualifier Code
Area 1							
CP38-085	4	6	Cis 1,2-Dichloroethene	18	*	J	V1
CP38-085	4	6	Tetrachloroethene	76.3	615000	-	V1
CP38-085	24	24.5	Carbon Tetrachloride	12.8	81500	-	V1
CP38-085	24	24.5	Cis 1,2-Dichloroethene	14.4	*	-	V1
CP38-085	24	24.5	Tetrachloroethene	66.9	615000	-	V1
CP38-085	24	24.5	Trichloroethene	14.2	19600	-	V1
CP38-085	24.5	26	Cis 1,2-Dichloroethene	0.787	*	J	V1
CP38-086	4	6	Cis 1,2-Dichloroethene	18	*	J	V1
CP38-086	13.5	14.5	Cis 1,2-Dichloroethene	3.4	*	J	V1
CP38-086	24	24.5	Carbon Tetrachloride	43.2	81500	-	V1
CP38-086	24	24.5	Cis 1,2-Dichloroethene	39.3	*	-	V1
CP38-086	24	24.5	Tetrachloroethene	94.8	615000	-	V1
CP38-086	24	24.5	Trichloroethene	24.4	19600	-	V1
CP38-086	24.5	26	Carbon Tetrachloride	34	81500	-	V1
CP38-086	24.5	26	Cis 1,2-Dichloroethene	28.9	*	-	V1
CP38-086	24.5	26	Tetrachloroethene	59.8	615000	-	V1
CP38-086	24.5	26	Trichloroethene	21.3	19600	-	V1
CP38-086	26	27	Carbon Tetrachloride	27.6	81500	-	V1
CP38-086	26	27	Cis 1,2-Dichloroethene	10.5	*	J	V1
CP38-086	26	27	Tetrachloroethene	25.9	615000	-	V1
CP38-086	26	27	Trichloroethene	21.8	19600	-	V1
CP38-087	3	4	Cis 1,2-Dichloroethene	2.8	*	J	V1
CP38-087	3	4	Tetrachloroethene	17	615000	B	V1
CP38-087	3	4	Cis 1,2-Dichloroethene	3.1	*	J	V1
CP38-087	14.5	15	Cis 1,2-Dichloroethene	33.9	*	-	V1
CP38-087	14.5	15	Tetrachloroethene	12.2	615000	B	V1
CP38-087	23.9	24.4	Cis 1,2-Dichloroethene	0.58	*	J	V1
CP38-087	23.9	24.4	Tetrachloroethene	37.1	615000	-	V1
CP38-087	24.4	24.9	Carbon Tetrachloride	19.5	81500	-	V1
CP38-087	24.4	24.9	Cis 1,2-Dichloroethene	5.4	*	J	V1
CP38-087	24.4	24.9	Tetrachloroethene	29.6	615000	-	V1
CP38-087	24.4	24.9	Trichloroethene	26	19600	-	V1
CP38-088	3.4	4	Acetone	7.1	102000000	J	V1
CP38-088	3.4	4	Methylene chloride	2	2530000	JB	JB1
CP38-088	3.4	4	Tetrachloroethene	3.8	615000	J	V1
CP38-088	3.4	4	Trichloroethene	2.8	19600	J	V1
CP38-088	4	6	Acetone	6.4	102000000	J	V1
CP38-088	4	6	Methylene chloride	1.8	2530000	JB	JB1
CP38-088	4	6	Tetrachloroethene	0.51	615000	J	V1
CP38-088	4	6	Trichloroethene	0.62	19600	J	V1
CP38-088	13.4	14.4	Acetone	6.7	102000000	J	V1

Table 1 Analytical Results of VOC Sampling at the 903 Pad (continued)

Location Code	Start Depth (Feet)	End Depth (Feet)	Analyte	Result (ug/kg)	Wildlife Refuge Worker Soil Action Level (ug/kg)	Lab Result Qualifier Codes	Validation Qualifier Code
CP38-088	13.4	14.4	Methylene chloride	1.6	2530000	JB	JB1
CP38-088	13.4	14.4	Tetrachloroethene	0.32	615000	J	V1
CP38-088	17.1	18.1	Acetone	11	102000000	J	V1
CP38-088	17.1	18.1	Carbon Tetrachloride	9.7	81500	-	V1
CP38-088	17.1	18.1	Chloroform	1.3	19200	J	V1
CP38-088	17.1	18.1	Methylene chloride	1.6	2530000	JB	JB1
CP38-088	17.1	18.1	Styrene	0.14	123000000	JB	JB1
CP38-088	17.1	18.1	Tetrachloroethene	14	615000	-	V1
CP38-088	17.1	18.1	Toluene	0.15	31300000	JB	V1
CP38-088	17.1	18.1	Trichloroethene	11	19600	-	V1
CP38-088	23	23.7	Acetone	8.5	102000000	J	V1
CP38-088	23	23.7	Cis 1,2-Dichloroethene	1.6	*	J	V1
CP38-088	23	23.7	Methylene chloride	2.6	2530000	JB	JB1
CP38-088	23	23.7	Tetrachloroethene	0.27	615000	J	V1
CP38-088	23.7	24.1	Acetone	8	102000000	J	V1
CP38-088	23.7	24.1	Carbon Tetrachloride	0.78	81500	J	V1
CP38-088	23.7	24.1	Cis 1,2-Dichloroethene	4	*	J	V1
CP38-088	23.7	24.1	Methylene chloride	2.9	2530000	JB	JB1
CP38-088	23.7	24.1	Tetrachloroethene	0.91	615000	J	V1
CP38-088	23.7	24.1	Trichloroethene	0.55	19600	J	V1
CP38-089	3	4	Tetrachloroethene	10.6	615000	-	V1
CP38-089	17	18	Carbon Tetrachloride	223	81500	E	V1
CP38-089	17	18	Cis 1,2-Dichloroethene	2.32	*	J	V1
CP38-089	17	18	Tetrachloroethene	228	615000	E	V1
CP38-089	17	18	Trichloroethene	167	19600	-	V1
CP38-089	21.5	22.5	Carbon Tetrachloride	22.4	81500	-	V1
CP38-089	21.5	22.5	Tetrachloroethene	16.5	615000	-	V1
CP38-089	21.5	22.5	Trichloroethene	7.18	19600	-	V1
CP38-089	22.5	23.5	Carbon Tetrachloride	305	81500	E	V1
CP38-089	22.5	23.5	Tetrachloroethene	77.7	615000	-	V1
CP38-089	22.5	23.5	Trichloroethene	54.8	19600	-	V1
CP38-090	3.3	4	Acetone	9	102000000	J	V1
CP38-090	3.3	4	Methylene chloride	1.9	2530000	JB	JB1
CP38-090	3.3	4	Tetrachloroethene	2.4	615000	J	V1
CP38-090	3.3	4	Trichloroethene	0.69	19600	J	V1
CP38-090	4	6	Acetone	9.6	102000000	J	V1
CP38-090	4	6	Methylene chloride	1.8	2530000	JB	JB1
CP38-090	4	6	Tetrachloroethene	0.44	615000	J	V1
CP38-090	4	6	Trichloroethene	0.27	19600	J	V1
CP38-090	21	22	2-Butanone	2.2	192000000	J	V1
CP38-090	21	22	Acetone	10	102000000	J	V1
CP38-090	21	22	Methylene chloride	1.6	2530000	JB	JB1

Table 1 Analytical Results of VOC Sampling at the 903 Pad (continued)

Location Code	Start Depth (Feet)	End Depth (Feet)	Analyte	Result (ug/kg)	Wildlife Refuge Worker Soil Action Level (ug/kg)	Lab Result Qualifier Codes	Validation Qualifier Code
CP38-090	21	22	Tetrachloroethene	3.7	615000	J	V1
CP38-090	21	22	Trichloroethene	1.3	19600	J	V1
CP38-090	22	23	Carbon Tetrachloride	8.4	81500	-	V1
CP38-090	22	23	Chloroform	0.46	19200	J	V1
CP38-090	22	23	Methylene chloride	1.8	2530000	JB	JB1
CP38-090	22	23	Tetrachloroethene	43	615000	-	V1
CP38-090	22	23	Trichloroethene	5.3	19600	J	V1
CP39-059	3.2	4.5	Tetrachloroethene	19.6	615000	B	J1
CP39-060	3.4	4.5	Cis 1,2-Dichloroethene	10	*	J	V1
CP39-060	3.4	4.5	Tetrachloroethene	109	615000	-	V1
CP39-060	4.5	6	Cis 1,2-Dichloroethene	12.9	*	-	V1
CP39-060	4.5	6	Tetrachloroethene	36.9	615000	-	V1
CP39-060	11.7	11.9	Cis 1,2-Dichloroethene	4.1	*	J	V1
CP39-060	11.7	11.9	Tetrachloroethene	40	615000	-	V1
CP39-060	15.8	16.3	Cis 1,2-Dichloroethene	116	*	-	V1
CP39-060	15.8	16.3	Tetrachloroethene	269	615000	E	V1
CP39-060	15.8	16.3	Trichloroethene	12.9	19600	-	V1
CP39-060	16.3	16.8	Cis 1,2-Dichloroethene	27.7	*	-	V1
CP39-060	16.3	16.8	Tetrachloroethene	61	615000	-	V1
CP39-061	3.5	4.5	Tetrachloroethene	14.2	615000	-	V1
CP39-061	4.5	6	Tetrachloroethene	21.3	615000	-	V1
CP39-061	14.2	14.7	Tetrachloroethene	19	615000	-	V1
CP39-061	14.7	15.2	Cis 1,2-Dichloroethene	11	*	-	V1
CP39-061	14.7	15.2	Tetrachloroethene	910	615000	E	V1
CP39-061	14.7	15.2	Trichloroethene	71.4	19600	-	V1
CP39-061	16.8	17.3	Tetrachloroethene	63.5	615000	-	V1
CP39-061	19.5	20	Tetrachloroethene	47	615000	-	V1
CP39-061	20	20.5	Carbon Tetrachloride	56.2	81500	-	V1
CP39-061	20	20.5	Cis 1,2-Dichloroethene	5.64	*	J	V1
CP39-061	20	20.5	Tetrachloroethene	781	615000	E	V1
CP39-062	3.4	4.5	Cis 1,2-Dichloroethene	24	*	J	V1
CP39-062	3.4	4.5	Tetrachloroethene	81.2	615000	-	V1
CP39-062	4.5	6	Cis 1,2-Dichloroethene	89.2	*	-	V1
CP39-062	4.5	6	Tetrachloroethene	35	615000	-	V1
CP39-062	19.1	19.5	Cis 1,2-Dichloroethene	29.1	*	-	V1
CP39-062	19.1	19.5	Tetrachloroethene	69.3	615000	-	V1
CP39-062	19.1	19.5	Trichloroethene	6.55	19600	-	V1
CP39-062	21	22	Carbon Tetrachloride	35.7	81500	-	V1
CP39-062	21	22	Cis 1,2-Dichloroethene	9.4	*	-	V1
CP39-062	21	22	Tetrachloroethene	99.1	615000	-	V1
CP39-062	22	23	Carbon Tetrachloride	20.8	81500	-	V1
CP39-062	22	23	Cis 1,2-Dichloroethene	9.4	*	J	V1

Table 1 Analytical Results of VOC Sampling at the 903 Pad (continued)

Location Code	Start Depth (Feet)	End Depth (Feet)	Analyte	Result (ug/kg)	Wildlife Refuge Worker Soil Action Level (ug/kg)	Lab Result Qualifier Codes	Validation Qualifier Code
CP39-062	22	23	Tetrachloroethene	39.1	615000	-	V1
CP39-063	3	4	Cis 1,2-Dichloroethene	1.6	*	J	V1
CP39-063	4.5	6	Cis 1,2-Dichloroethene	7.08	*	-	V1
CP39-063	13.5	14	Cis 1,2-Dichloroethene	31.9	*	-	V1
CP39-063	13.5	14	Tetrachloroethene	47.8	615000	B	J1
CP39-063	14	14.5	Cis 1,2-Dichloroethene	44.6	*	-	V1
CP39-063	14	14.5	Tetrachloroethene	62.4	615000	B	J1
Area 2							
CP39-064	3.5	4.5	Acetone	8	102000000	J	V1
CP39-064	3.5	4.5	Methylene chloride	2.1	2530000	JB	JB1
CP39-064	3.5	4.5	Naphthalene	0.56	3090000	JB	JB1
CP39-064	4.5	6	1,2,4-Trichlorobenzene	0.51	9230000	JB	JB1
CP39-064	4.5	6	1,2-Dichlorobenzene	0.19	31200000	JB	JB1
CP39-064	4.5	6	Acetone	11	102000000	J	V1
CP39-064	4.5	6	Methylene chloride	2.2	2530000	JB	JB1
CP39-064	4.5	6	Naphthalene	1.1	3090000	JB	JB1
CP39-064	4.5	6	Styrene	0.086	123000000	JB	JB1
CP39-064	9.5	10.5	1,2,4-Trichlorobenzene	0.32	9230000	JB	JB1
CP39-064	9.5	10.5	1,2-Dichlorobenzene	0.12	31200000	JB	JB1
CP39-064	9.5	10.5	Acetone	18	102000000	J	V1
CP39-064	9.5	10.5	Methylene chloride	2	2530000	JB	JB1
CP39-064	9.5	10.5	Naphthalene	0.71	3090000	JB	JB1
CP39-064	10.5	11.5	Acetone	6.4	102000000	J	V1
CP39-064	10.5	11.5	Methylene chloride	2	2530000	JB	JB1
CP39-064	10.5	11.5	Naphthalene	0.52	3090000	JB	JB1
CP39-064	14.2	15.2	Acetone	6.5	102000000	J	V1
CP39-064	14.2	15.2	Methylene chloride	2.4	2530000	JB	JB1
CP39-064	14.2	15.2	Naphthalene	0.43	3090000	JB	JB1
CP39-064	15.2	16.2	Acetone	6.1	102000000	J	V1
CP39-064	15.2	16.2	Methylene chloride	2	2530000	JB	JB1
CP39-066	3.3	4	Carbon Tetrachloride	257	81500	E	V1
CP39-066	3.3	4	Tetrachloroethene	782	615000	E	V1
CP39-066	4	6	Carbon Tetrachloride	6200	81500	E	V1
CP39-066	4	6	Tetrachloroethene	7180	615000	E	V1
CP39-066	15.6	16.1	Carbon Tetrachloride	638	81500	E	V1
CP39-066	15.6	16.1	Chloroform	137	19200	-	V1
CP39-066	15.6	16.1	Tetrachloroethene	57.7	615000	-	V1
CP39-066	16.1	16.6	Carbon Tetrachloride	1300	81500	E	V1
CP39-066	16.1	16.6	Chloroform	137	19200	-	V1
Area 3							
CP38-091	4	6	Tetrachloroethene	682	615000	E	V1

Table 1 Analytical Results of VOC Sampling at the 903 Pad (continued)

Location Code	Start Depth (Feet)	End Depth (Feet)	Analyte	Result (ug/kg)	Wildlife Refuge Worker Soil Action Level (ug/kg)	Lab Result Qualifier Codes	Validation Qualifier Code
CP38-091	24	24.4	Carbon Tetrachloride	1000	81500	E	J1
CP38-091	24	24.5	Carbon Tetrachloride	995	81500	E	J1
CP38-091	24	24.4	Chloroform	24	19200	-	V1
CP38-091	24	24.4	Cis 1,2-Dichloroethene	4	*	J	V1
CP38-091	24	24.5	Tetrachloroethene	31.7	615000	-	V1
CP38-091	24	24.4	Tetrachloroethene	7.48	615000	-	V1
CP38-091	24	24.4	Trichloroethene	15.1	19600	-	V1
CP38-091	24	24.5	Trichloroethene	55.9	19600	-	V1
CP38-092	3.5	5.5	Cis 1,2-Dichloroethene	2.69	*	J	V1
CP38-092	3.5	5.5	Tetrachloroethene	35.5	615000	-	V1
CP38-092	5.5	6	Cis 1,2-Dichloroethene	0.634	*	J	V1
CP38-092	5.5	6	Tetrachloroethene	6.1	615000	-	V1
CP38-092	20	21	Cis 1,2-Dichloroethene	0.934	*	J	V1
CP38-092	26.4	27	Carbon Tetrachloride	332	81500	E	J1
CP38-092	26.4	27	Cis 1,2-Dichloroethene	1.7	*	J	V1
CP38-092	26.4	27	Chloroform	273	19200	E	V1
CP38-092	26.4	27	Tetrachloroethene	16.5	615000	-	V1
CP38-092	26.4	27	Trichloroethene	22.5	19600	-	V1
CP38-092	27	27.5	Carbon Tetrachloride	1820	81500	E	J1
CP38-092	27	27.5	Cis 1,2-Dichloroethene	3.1	*	J	V1
CP38-092	27	27.5	Chloroform	67.5	19200	-	V1
CP38-092	27	27.5	Tetrachloroethene	19.3	615000	-	V1
CP38-092	27	27.5	Trichloroethene	85	19600	-	V1
CP38-093	4	6	Tetrachloroethene	12.6	615000	-	V1
CP38-093	27.5	28	Carbon Tetrachloride	126	81500	-	V1
Area 4							
CO38-082	3	5	Methylene chloride	1.5	2530000	JB	JB1
CO38-082	3	5	Tetrachloroethene	0.4	615000	JB	JB1
CO38-082	3	5	Toluene	0.14	31300000	JB	JB1
CO38-082	5	6	Acetone	18	102000000	J	V1
CO38-082	5	6	Methylene chloride	1.4	2530000	JB	JB1
CO38-082	5	6	Tetrachloroethene	0.46	615000	JB	JB1
CO38-082	5	6	Toluene	0.13	31300000	JB	JB1
CO38-082	16.7	17.2	Acetone	56	102000000	-	V1
CO38-082	16.7	17.2	Carbon Tetrachloride	170	81500	-	V1
CO38-082	16.7	17.2	Chloroform	6.6	19200	-	V1
CO38-082	16.7	17.2	Methylene chloride	1.3	2530000	JB	JB1
CO38-082	16.7	17.2	Tetrachloroethene	0.68	615000	JB	JB1
CO38-082	16.7	17.2	Toluene	0.12	31300000	JB	JB1
CO38-082	16.7	17.2	Trichloroethene	0.24	19600	J	V1
CO38-082	17.2	17.8	1,1-Dichloroethane	0.25	22500000	J	V1
CO38-082	17.2	17.8	1,1-Dichloroethene	7.8	17000	-	V1

Table 1 Analytical Results of VOC Sampling at the 903 Pad (continued)

Location Code	Start Depth (Feet)	End Depth (Feet)	Analyte	Result (ug/kg)	Wildlife Refuge Worker Soil Action Level (ug/kg)	Lab Result Qualifier Codes	Validation Qualifier Code
CO38-082	17.2	17.8	1,2-Dichloroethane	0.88	106000	J	V1
CO38-082	17.2	17.8	Acetone	18	102000000	J	V1
CO38-082	17.2	17.8	Bromodichloromethane	0.44	617000	J	V1
CO38-082	17.2	17.8	Carbon Tetrachloride	1800	81500	E	J1
CO38-082	17.2	17.8	Chloroform	61	19200	-	V1
CO38-082	17.2	17.8	Methylene chloride	1.8	2530000	JB	JB1
CO38-082	17.2	17.8	Tetrachloroethene	1.4	615000	JB	JB1
CO38-082	17.2	17.8	Toluene	0.11	31300000	JB	JB1
CO38-082	17.2	17.8	Trichloroethene	3	19600	J	V1
CO38-083	17.5	18	Carbon Tetrachloride	109	81500	-	V1
CO38-084	17.5	18	Carbon Tetrachloride	228	81500	E	V1
CO38-084	17.5	18	Chloroform	13.7	19200	-	V1
CO38-085	3	4	Carbon Tetrachloride	47	81500	-	V1
CO38-085	4	6	Carbon Tetrachloride	101	81500	-	V1
CO38-085	15	15.5	Carbon Tetrachloride	165	81500	-	V1
CO38-085	15	15.5	Chloroform	15.1	19200	-	V1
CO38-085	15.5	16	Carbon Tetrachloride	45.4	81500	-	V1
CO38-085	15.5	16	Chloroform	41.4	19200	-	V1
CO39-039	10	12	Carbon Tetrachloride	55.3	81500	-	V1
CO39-039	16.6	17.1	Carbon Tetrachloride	33.2	81500	-	V1
CO39-039	16.6	17.1	Chloroform	24.6	19200	-	V1
Area 5							
CP37-073	2.4	4.4	Tetrachloroethene	14.1	615000	-	V1
CP37-073	4.4	6	Tetrachloroethene	6.38	615000	-	V1
CP37-073	18.7	19.2	Tetrachloroethene	17.5	615000	-	V1
CP37-073	18.7	19.2	Trichloroethene	6.18	19600	-	V1
CP37-073	19.2	19.7	1,1-Dichloroethene	6.61	17000	-	V1
CP37-073	19.2	19.7	Tetrachloroethene	154	615000	-	V1
CP37-073	19.2	19.7	Trichloroethene	123	19600	-	V1
CQ37-086	18.7	19.2	Tetrachloroethene	18.8	615000	-	V1
CQ37-086	20	20.2	Tetrachloroethene	60.2	615000	-	V1
CQ37-086	20	20.2	Trichloroethene	59.4	19600	-	V1
CQ37-087	4.3	6	Tetrachloroethene	17.7	615000	-	V1
CQ37-087	17.8	18.3	Tetrachloroethene	109	615000	-	V1
CQ37-087	17.8	18.3	Trichloroethene	18.6	19600	-	V1

* = No action level for specific isomer

B = Detected in laboratory blank

E = Estimated value exceeding calibration range

J = Estimated value below required detection limit

V1 = Verified data

**Groundwater IM/IRA - 903 Pad VOC
Investigation**

Area 1

Borehole Logs

ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE BOREHOLE LOG

PAGE 1 OF 3

Borehole Number: CP38-085

Surface Elevation: _____

Location - North: 749139.2 East: 2085675 N 749130.6Area: 900-11 (903 Pad)Date: 3/9/05

E 2085934

Total Depth: _____

Geologist: Z TutaCompany: URSProject No.: GR210100Drilling Equip.: AMS POWERPROBE 9620 TITANSample Type: AMS DUAL TUBE

RMRS LOGGING SUPERVISOR

APPROVAL _____

DATE _____

TOP/BOTTOM OF CORE IN BOX	TOP/BOTTOM OF INTERVAL	FEET OF CORE IN INTERVAL MEASUREMENT	SAMPLE NUMBER	FRACTURE ANGLE	SEDDING ANGLE	GRAIN SIZE DISTRIBUTION	USCS SYMBOL	DEPTH IN FEET	SOIL LITHOLOGIC LOG	SAMPLE DESCRIPTION
	2.6 4.0						F I L L SW	1 2 3		0-4.0' Gravelly sand, very dark grayish brown 10YR 3/2, fine-coarse, well-graded, subround, etc, slightly moist, [FILL]
	4.0 3.5 3.5 4.0		4.0 A				GC GC	4 5 6		4.0-5.5 Clayey gravel w/ sand, brownish yellow 10YR 6/6, coarse, poorly graded, subround, etcite/diorite, etc moist grading down to slightly moist
	8.0	4.0 4.0					GC	7 8 9		5.5-8.0 Sandy gravel w/ clay, lt yellowish brown, 10YR 6/4, coarse, poorly graded, subround, etcite/diorite, moist to dry
								10		8.0-12.0 clayey gravel with sand, yellowish red 5YR 4/6, coarse, poorly graded, subround, etcite/diorite, slightly moist

NOTES: General: USCS is modified for this log as follows:

Materials amounts are estimated by % volume instead of % weight.

(1) Badly broken core, accurate footage measurements not possible.

(2) Core breaks cannot be matched, accurate footage measurements not possible.

Procedure No. RMRS/OPS-PRO-101

Revision 0

Date effective: 12/31/98

Page 27 of 28

ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE BOREHOLE LOG

PAGE 1 OF 3

Borehole Number: CP 38-085

Surface Elevation: _____

Location - North: 749139.2 East: 2685675 N 749130.6Area: 100-11 (903 Pad)Date: 3/9/05

Total Depth: _____

Geologist: Z TutaCompany: URSProject No.: GR210100Drilling Equip.: AMS POWERPROBE 9620 TITANSample Type: AMS DUAL TUBE

RMRS LOGGING SUPERVISOR

APPROVAL _____

DATE _____

TOP/BOTTOM OF CORE IN BOX	TOP/BOTTOM OF INTERVAL	FEET OF CORE IN INTERVAL (FIELD MEASUREMENT)	SAMPLE NUMBER	FRACTURE ANGLE	BEDDING ANGLE	GRAIN SIZE DISTRIBUTION	USCS SYMBOL	DEPTH IN FEET	SOIL LITHOLOGIC LOG	SAMPLE DESCRIPTION
	2.6 4.0						F 1 L L SW	1 2 3		0-4.0' Gravelly sand, very dark grayish brown 10YR 3/2, fine-coarse, well-graded, subround, etc, slightly moist, [FILL]
	4.0 3.5 31	3.5 4.0	A				GC	4 5		4.0-5.5 Clayey gravel w/ sand, brownish yellow 10YR 6/6, coarse, poorly graded, subround, etcite/diorite, etc moist, grading down to slightly moist.
			6.0				GC	6 7		5.5-8.0 Sandy gravel w/ clay, lt yellowish brown, 10YR 8/4, coarse, poorly graded, subround, etcite/diorite, moist to dry.
	8.0	4.0 4.0					GC	8 9		8.0-12.0 clayey gravel with sand, yellowish red 5YR 4/6, coarse, poorly graded, subround, etcite/diorite, slightly moist.
								10		

NOTES: General: USCS is modified for this log as follows:

Materials amounts are estimated by % volume instead of % weight.

(1) Badly broken core, accurate footage measurements not possible.

(2) Core breaks cannot be matched, accurate footage measurements not possible.

Procedure No. RMRS/OPS-PRO-101

Revision 0

Date effective: 12/31/98

Page 27 of 28

ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE BOREHOLE LOG

PAGE 2 OF 3

Borehole Number: CP38-085

N 749/52 Surface Elevation: SURVEY

Location - North: 749179 2, East: 2085675 2

Area: 700-11 (903 Pad)

Date: 3/9/05

Total Depth:

Geologist: Z. Tutu

Company: KRS

Project No.: GR210100

Drilling Equip.: AMS POWERPROBE 9620 TITAN

Sample Type: AMS DUAL TUBE

RMRS LOGGING SUPERVISOR

APPROVAL

DATE _____

TOP/BOTTOM OF CORE IN BOX	TOP/BOTTOM OF INTERVAL	FEET OF CORE IN INTERVAL (FIELD MEASUREMENT)	SAMPLE NUMBER	FRACTURE ANGLE	SIDDING ANGLE	GRAIN SIZE DISTRIBUTION	USCS SYMBOL	DEPTH IN FEET	SOIL LITHOLOGIC LOG	SAMPLE DESCRIPTION
							GC	10		10 to 11 ft grades to lt olive gray 54 6/2
	12.6	4.0 / 4.0						11		
			15.0					12		12.0 - 16.0 Clayey gravel with sand, as above 9.0 - 12.0
			B					13		
								14		
								15		[REFUSAL AT 16.0 FT. OFFSET ~ 5 FT East. Push solid ft to 14.5 ft & resume sampling]
	16.0	2.9 / 4.0	16.0				GC	16		16.0 - 20.0 Clayey gravel w/ sand coarse, poorly graded, subangular quartzite, dry. Quartzite boulder from 16.0 - 16.5
								17		
								18		
								19		

NOTES: General USCS is modified for this log as follows:

Materials amounts are estimated by % volume instead of % weight.

(1) Badly broken core, accurate footage measurements not possible.

(2) Core breaks cannot be matched, accurate footage measurements not possible.

Procedure No. RMRS/OPS-PRO.101

Revision 0.

Date effective: 12/31/98

Page 27 of 28

ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE BOREHOLE LOG

PAGE 3 OF 3

Borehole Number: CP38-085Surface Elevation: SURVEYLocation - North: 249152 East: 2085934Area: 700-11 (903 Pad)Date: 3/9/05

Total Depth: _____

Geologist: Z TATACompany: URSProject No.: GR210100Drilling Equip.: AMS POWERPROBE 9620 TITANSample Type: AMS DUAL TUBE

RMRS LOGGING SUPERVISOR

APPROVAL _____

DATE _____

TOP/BOTTOM OF CORE IN SOIL	TOP/BOTTOM OF INTERVAL	FEET OF CORE IN INTERVAL (FIELD MEASUREMENT)	SAMPLE NUMBER	FRACTURE ANGLE	BEDDING ANGLE	GRAIN SIZE DISTRIBUTION	USCS SYMBOL	DEPTH IN FEET	SOIL LITHOLOGIC LOG	SAMPLE DESCRIPTION
			21.0				GC	20		20-22.0 Clayey gravel w/ sand, as above.
			C					21		
			22.0					22		
	22.0	TD	REF	USA						22.0 REFUSAL

NOTES: General USCS is modified for this log as follows:

Materials amounts are estimated by % volume instead of % weight.

(1) Badly broken core, accurate footage measurements not possible.

(2) Core breaks cannot be matched, accurate footage measurements not possible.

Procedure No. RMRS/OPS-PRO-101

Revision 0

Date effective: 12/31/98

Page 27 of 28

ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE BOREHOLE LOG

PAGE 1 OF 1

Borehole Number: CP38-085
 Location - North: Survey East: Survey
 Date: 3/28/05
 Geologist: N. Williams
 Drilling Equip.: Large Wireline AP 1000

Surface Elevation: Survey
 Area: 903
 Total Depth: 28'
 Company: URS Project No.:
 Sample Type: SPLT SPT

RMRS LOGGING SUPERVISOR

APPROVAL

DATE

TOP/BOTTOM OF CORE IN SOIL	TOP/BOTTOM OF INTERVAL	FEET OF CORE IN INTERVAL IN FIELD MEASUREMENT	SAMPLE NUMBER	FRACTURE ANGLE	SECOND ANGLE	GRAN SIZE DISTRIBUTION	USCS SYMBOL	DEPTH IN FEET	SOIL LITHOLOGIC LOG	SAMPLE DESCRIPTION
		<u>0.5</u> <u>2.0</u>					<u>GL</u>	<u>18</u> <u>22</u>		0-22' bgs - Percussion drill. See Powerprobe logs for details.
		<u>1.0</u> <u>2.0</u>					<u>GL</u>	<u>22</u> <u>23</u>		22-22.5 gravelly sand; well graded; Dk yellow brown; subround grs. qtz pte grade; no bed. n TD=0 Rocky material / poor recovery /
							<u>GL</u>	<u>24</u> <u>25</u>		22.5-24-26' clay Dk brown; poor grading; F. grad; damp low plastic; some sands/fines @ 22.5-23 bgs / Grey material Sample 24-24.5 (D) / 24.5-26 = E Top - above bedrock E collected in weathered bedrock
							<u>GL</u>	<u>26</u> <u>27</u>		26-28 Dk grey (25% 1/2) siltstone F grad / poor grading / dry and tightly packed / some bedding planes visible / nonplastic
							<u>GL</u>	<u>28</u>		TD-28' bgs

NOTES: General: USCS is modified for this log as follows:

Materials amounts are estimated by % volume instead of % weight.

(1) Badly broken core, accurate footage measurements not possible.

(2) Core breaks cannot be matched, accurate footage measurements not possible.

Procedure No. RMRS/OPS-PRO.101

Revision 0

Date effective: 12/31/98

Page 27 of 28

ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE BOREHOLE LOG

PAGE 1 OF 2

Borehole Number: CP38-086Location - North: Survey East: SurveyDate: 8-14-05Geologist: A PachecoDrilling Equip.: AMS POWERPORE 9620 TITANSurface Elevation: SurveyArea: 900-11 (903 Pad)Total Depth: 12.5'Company: URSProject No.: 6210100Sample Type: AMS DUAL TUBE

RMRS LOGGING SUPERVISOR

APPROVAL _____

DATE _____

TOP/BOTTOM OF CORE IN BOX	TOP/BOTTOM OF INTERVAL	FEET OF CORE IN INTERVAL MEASUREMENT	SAMPLE NUMBER	FRACTURE ANGLE	BEDDING ANGLE	GRAN SIZE DISTRIBUTION	USCS SYMBOL	DEPTH IN FEET	SOIL LITHOLOGIC LOG	SAMPLE DESCRIPTION
							GM	0		0-4.0 Sand-silt-clay mixture with gravel Dark brown 7.5YR3/4 poorly-graded gravel 0.05 in subangular quartzite Silt/clay - soft, slightly moist [Fill]
4.0	4.0	4.0	4.0					1		
								2		
								3		
								4		
			A VOC FD				CL	4		4.0 - 12.0 Gravelly Sandy clay
								5		Soft, slightly moist in upper 2 feet (4-6')
								6		stiff, slightly moist in lower 2 feet (6-8')
			6.0					7		Gravel - poorly graded subangular qtzite (0.1 in), (at 6-6.1' 5% more)
								8		Sand - coarse subangular subrounded
8.0	8.0	4.0						9		

NOTES: General: USCS is modified for this log as follows:

Materials amounts are estimated by % volume instead of % weight.

(1) Badly broken core, accurate footage measurements not possible.

(2) Core breaks cannot be matched, accurate footage measurements not possible.

Procedure No. RMRS/OPS-PRO.101

Revision 0

Date effective: 12/31/98

Page 27 of 28

ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE BOREHOLE LOG

Borehole Number: CP38-086
 Location - North: Surveyed East Surveyed
 Date: 3-14-05
 Geologist: A. Padgett
 Drilling Equip.: Ams Powerprobe 9000 TITAN
 Surface Elevation: Survey
 Area: 900-11 (903 R.d.)
 Total Depth: 14.5'
 Company: URS
 Sample Type: Ams Dual Tube
 Project No.: 68210100

RMRS LOGGING SUPERVISOR
 APPROVAL

DATE

TOP/BOTTOM OF CORE IN BOX	TOP/BOTTOM OF INTERVAL	FEET OF CORE IN INTERVAL MEASUREMENT	SAMPLE NUMBER	FRACTURE ANGLE	BEDDING ANGLE	GRAIN SIZE DISTRIBUTION	USCS SYMBOL	DEPTH IN FEET	SOIL LITHOLOGIC LOG	SAMPLE DESCRIPTION
---------------------------	------------------------	--------------------------------------	---------------	----------------	---------------	-------------------------	-------------	---------------	---------------------	--------------------

								10		10-12 Sec above
		12.0	14.0					11		
								12		12-14.5 Gravelly Sandy Clay as above
								13		12.5 Refusal on 2nd hole
								14		14.5 Refusal on 1st hole. Offset 5' south.
		14.5						15		
								16		
								17		
								18		
								19		
								20		

NOTES: General: USCS is modified for this log as follows:

- (1) Badly broken core, accurate footage measurements not possible.
- (2) Core breaks cannot be matched, accurate footage measurements not possible.

Procedure No. RMRS/OPS-PRO.101
 Revision 0
 Date effective: 12/31/98
 Page 27 of 28

ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE BOREHOLE LOG

PAGE 1 OF 2Borehole Number: CP38-086Surface Elevation: 607

Location - North: _____ East: _____

Area: 900-11 903 Pa2Date: 3/24/05 & 3/24/05 & 3/28/05

Total Depth: _____

Geologist: 2 Turner / A. Pacheco / N. WilliamsCompany: URSProject No.: GA210100Drilling Equip.: Layco Western AP-1000Sample Type: Split Spoon

RMRS LOGGING SUPERVISOR

APPROVAL _____

DATE _____

TOP/BOTTOM OF CORE IN BOX	TOP/BOTTOM OF INTERVAL	FEET OF CORE IN INTERVAL (FIELD MEASUREMENT)	SAMPLE NUMBER	FRACTURE ANGLE	BEDDING ANGLE	GRAIN SIZE DISTRIBUTION	USCS SYMBOL	DEPTH IN FEET	SOIL LITHOLOGIC LOG	SAMPLE DESCRIPTION
		0.6 1.0					GC	18		[Dual wall - reverse circulation percussion drilled 9-18 ft] no samples, water added to air!
								19		Clayey gravel 17 grey 104A 7/2 coarse, poorly graded, subround wet*
								20		
								21		[18-22 Dual-wall reverse circ. - no sample - cuttings as above - stop for day at 22']
								22		
								23		
								24	C SM	24-26 silty weathered siltstone (split spoon push); grey fine material. poor grading; weathered; but some sand gravel @ top - collect 24-24.5' bgs 24
								25		above bedrock (CP38-86C)
								26	CL	- collect 24.5 - 26 as weathered bedrock (-C86D)
								27		

NOTES: General: USCS is modified for this log as follows:

Materials amounts are estimated by % volume instead of % weight.

(1) Badly broken core, accurate footage measurements not possible.

(2) Core breaks cannot be matched, accurate footage measurements not possible.

Procedure No. RMRS/OPS-PRO.101

Revision 0

Date effective: 12/31/98

Page 27 of 28

ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE BOREHOLE LOG

PAGE 2 OF 2

Borehole Number: CP38-086
 Location - North: SURVEY East: SURVEY
 Date: 3/28/05
 Geologist: N Williams
 Drilling Equip.: Longwell DP-1000

Surface Elevation: Survey
 Area: 703
 Total Depth: 28
 Company: URS Project No.:
 Sample Type: Split Spoon

RMRS LOGGING SUPERVISOR

APPROVAL _____

DATE _____

TOP/BOTTOM OF CORE IN BOX	TOP/BOTTOM OF INTERVAL	FEET OF CORE IN INTERVAL (FIELD MEASUREMENT)	SAMPLE NUMBER	FRACTURE ANGLE	BEDDING ANGLE	GRAIN SIZE DISTRIBUTION	USCS SYMBOL	DEPTH IN FEET	SOIL LITHOLOGIC LOG	SAMPLE DESCRIPTION
							CL	27		
								28		26-28 Split Spoon push weathered siltstone; grey poor grading; dry; no clear bedding; low plastic; dry tight siltstone; passing present (26-27' CP38-086 E 3/15/05) TD-28'

NOTES: General: USCS is modified for this log as follows:

Materials amounts are estimated by % volume instead of % weight.

(1) Badly broken core, accurate footage measurements not possible.

(2) Core breaks cannot be matched, accurate footage measurements not possible.

Procedure No. RMRS/OPS-PRO.101

Revision 0

Date effective: 12/31/98

Page 27 of 28

ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE BOREHOLE LOG

PAGE 1 OF 2

Borehole Number: CP38-087Location - North: Surveyed East: SurveyedDate: 3-14-05Geologist: A PachecoDrilling Equip.: AMS POWERPROBE 9620 TITANSurface Elevation: SurveyArea: 900-11 (903 Pad)Total Depth: 75'Company: URSProject No.: CR210100Sample Type: AMS Dual Tube

RMRS LOGGING SUPERVISOR

APPROVAL _____

DATE _____

TOP/BOTTOM OF CORE IN BOX	TOP/BOTTOM OF INTERVAL	FEET OF CORE IN INTERVAL (FIELD MEASUREMENT)	SAMPLE NUMBER	FRACTURE ANGLE	BEDDING ANGLE	GRAIN SIZE DISTRIBUTION	USCS SYMBOL	DEPTH IN FEET	SOIL/ LITHOLOGIC LOG	SAMPLE DESCRIPTION
							GM	0		0-3.0 Gravel, sand, silt clay mixture soft, slightly moist, compacted gravel-subangular qtzite 0.05 in
								1		
								2		[Fill]
								3		
4.0	4.0	4.0	3.0 A vac				GC	3		3.0 - Clayey Gravel with Sand
			4.0					4		Gravel-poorly-graded, subangular quartzite 0.05 - 0.7 in, crushed
			B vac					5		Clay- stiff, slightly moist, 5-10% Sand- <5% coarse subrounded
								6		pinkish gray 7.5YR 6/2 to lt. brown 7.5YR 6/4
			6.0					7		
								8		
8.0	8.0	4.0						9		

NOTES: General: USCS is modified for this log as follows:

Materials amounts are estimated by % volume instead of % weight.

(1) Badly broken core, accurate footage measurements not possible.

(2) Core breaks cannot be matched, accurate footage measurements not possible.

Procedure No. RMRS/OPS-PRO.101

Revision 0

Date effective: 12/31/98

Page 27 of 28

ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE BOREHOLE LOG

PAGE 2 OF 2

Borehole Number: CP38-087Location - North: Surveyed East: SurveyedDate: 3-14-05Geologist: A PachecoDrilling Equip.: AMS POWERPROBE 9620 TITANSurface Elevation: SURVEYArea: 900-11 (903 Pad)Total Depth: 15'Company: URSProject No. GE210100Sample Type: AMS Dual Tube

RMRS LOGGING SUPERVISOR

APPROVAL _____

DATE _____

TOP/BOTTOM OF CORE IN BOX	TOP/BOTTOM OF INTERVAL	FEET OF CORE IN INTERVAL (FIELD MEASUREMENT)	SAMPLE NUMBER	FRACTURE ANGLE	BEDDING ANGLE	GRAIN SIZE DISTRIBUTION	USCS SYMBOL	DEPTH IN FEET	SOIL LITHOLOGIC LOG	SAMPLE DESCRIPTION
12.0	12.0	4.0					GS CL	10		10-12 See above grading into Gravelly Sandy Clay Some alt. color: (5% more clay) dusky red OR 3/4 (5% less gravel) dk. greenish gray Gley 4/1 (5% more sand)
								11		
								12		Refusal at 12'
								13		
								14		
			14.5 Croc					15		15' Refusal on 1st hole. Offset 5' S.
		15.0						16		
								17		
								18		
								19		
								20		

NOTES: General: USCS is modified for this log as follows:

Materials amounts are estimated by % volume instead of % weight.

(1) Badly broken core, accurate footage measurements not possible.

(2) Core breaks cannot be matched, accurate footage measurements not possible.

Procedure No. RMRS/OPS-PRO.101

Revision 0

Date effective: 12/31/98

Page 27 of 28

ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE BOREHOLE LOG

PAGE 1 OF 1

Borehole Number: CP38-087

Location - North: _____ East: _____

Date: 3/15/05 & 3/16/05

Geologist: _____

Drilling Equip.: AMS Powerprobe 9620 Titan

Surface Elevation: _____

Area: 910-11 (903 pad)

Total Depth: _____

Company: URS Project No.: GR210700Sample Type: AMS Dual Tube

RMRS LOGGING SUPERVISOR

APPROVAL _____

DATE _____

TOP/BOTTOM OF CORE IN BOX	TOP/BOTTOM OF INTERVAL	FEET OF CORE IN INTERVAL (FIELD MEASUREMENT)	SAMPLE NUMBER	FRACTURE ANGLE	BEDDING ANGLE	GRAIN SIZE DISTRIBUTION	USCS SYMBOL	DEPTH IN FEET	SOIL LITHOLOGIC LOG	SAMPLE DESCRIPTION
								20		See 3/14/05 Boring log of CP38-087 for sample descriptions from 0 to 15' & samples A, B, C.
								21		[Advanced hollow stem augers (4 1/4" ID, 8 1/4" OP) at offset 2' S of original probe hole, from 0 to 22 ft, pulled augers & drive dual tube sampler]
	22.0	1.5 / 2.0						22		22.0 - 23.5 NO RECOVERY
								23		
	24.0	0 / 4.0 3/15/05					SW CL	24		23.5 - 24.0 sandy gravel, 17 brownish gray 10YR 6/2 to yellowish brown 10YR 5/8, fine, well-sorted, subround, quartzite, with clay (<10%), slightly moist.
		2.5 / 4.0 3/16/05						25		[No recovery 24-28' END OF DAY 3/15/05 3/16/05 pushed out dual tube rods in auger hole & push 22-26 ft, 2.5' recovery]
	26.0	2.2 / 4.0					GC	26		24-26' clayey gravelly clay, yellowish brown 10YR 5/4, soft, moist. w/ fine siltate gravel.
								27		26-27.4 clayey sandy, yellowish brown 10YR 5/6, fine, subround, poorly graded, siltate, slightly moist (in place?)
							CL	28		27.4-28.2 clay, gray, 5Y 5/1, very stiff, slightly moist. (in place?)
								29		[WEATHERED BEDROCK]
								30		28.2-30.0 TD NO RECOVERY
	30.0									30.0 T-D.

NOTES: General: USCS is modified for this log as follows:

Materials amounts are estimated by % volume instead of % weight.

(1) Badly broken core, accurate footage measurements not possible.

(2) Core breaks cannot be matched, accurate footage measurements not possible.

Procedure No. RMRS/OPS-PRO.101

Revision 0

Date effective: 12/31/98

Page 27 of 28

ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE BOREHOLE LOG

PAGE 1 OF 2

Borehole Number: CP38-086-088
 Location - North: 14930.6 East: 285934
 Date: CP38-086-088 3/10/05
 Geologist: Z TATA
 Drilling Equip.: AMS POWERPORE 9620 TITAN

Surface Elevation: Surf
 Area: 100-11 (903 Pad)
 Total Depth: _____
 Company: URS Project No.: 6R210700
 Sample Type: AMS DUAL TUBE

RMRS LOGGING SUPERVISOR

APPROVAL _____

DATE _____

TOP/BOTTOM OF CORE IN BOX	TOP/BOTTOM OF INTERVAL	FEET OF CORE IN INTERVAL MEASUREMENT	SAMPLE NUMBER	FAULTURE ANGLE	BEDDING ANGLE	GRAIN SIZE DISTRIBUTION	USCS SYMBOL	DEPTH IN FEET	SOIL LITHOLOGIC LOG	SAMPLE DESCRIPTION
		2.8 4.0					F ₁ L L	1		BEGIN 1207
							SW	2		
								3		
		3.3 A						4		3.4 - 8.0 Sandy gravel w/ clay, coarse, subround, poorly graded, diorite/gneiss, dry, strong brown 7.5 MPa 4/6
	4.0	4.0 4.0 B	4.0					5		
								6		
		6.0						7		
								8		8.0 - 12.0 Sandy gravel w/ clay, as above.
	8.0	4.0 4.0						9		
								10		

NOTES: General: USCS is modified for this log as follows:

Materials amounts are estimated by % volume instead of % weight.

(1) Badly broken core, accurate footage measurements not possible.

(2) Core breaks cannot be matched, accurate footage measurements not possible.

Procedure No. RMRS/OPS-PRO-101

Revision 0

Date effective: 12/31/98

Page 27 of 28

ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE BOREHOLE LOG

PAGE 2 OF 2

Borehole Number: CP 38-086-088

Surface Elevation: _____

Location - North: 249130.6 East: 2085934Area: 900-11 (903 Pad)Date: 3/10/05

Total Depth: _____

Geologist: Z TutaCompany: URSProject No.: GR210100Drilling Equip.: AMS POWERPROBESample Type: AMS DUAL TUBE

RMRS LOGGING SUPERVISOR

APPROVAL _____

DATE _____

TOP/BOTTOM OF CORE IN BOX	TOP/BOTTOM OF INTERVAL	PART OF CORE IN INTERVAL MEASUREMENT	SAMPLE NUMBER	FRACTURE ANGLE	BEDDING ANGLE	GRAN SIZE DISTRIBUTION	USCS SYMBOL	DEPTH IN FEET	SOIL LITHOLOGIC LOG	SAMPLE DESCRIPTION
								10		
								11		
	12.0	2.4 2.4 4.0 8						12		12.0 - 14.4 Clayey gravel with Sand, light olive gray 5Y 6/2, mottled with yellowish brown 10YR 5/8, coarse, poorly graded, subround, slightly moist.
		13.4	13.4					13		
								14		[Refusal at 14.4 ft, offset 5' w/ Buried solid pt to 12', sampler from 12']
	14.4	14.4	14.4					15		14.6 - 16.0 Sandy gravel with clay, yellowish red 5YR 5/8 to brownish yellow 10YR 6/6, coarse, subround, poorly graded, slightly moist.
OFF BT - push 12 - 16'		4.0 4.0						16		
	16.0	1.6 2.1						17		16.0 - 18.1 Sandy clay, olive gray 5Y 4/2, very stiff, slightly moist.
			12.1					18		
	18.1	18.1	18.1					19		18.1 REFUSAL
								20		

NOTES: General: USCS is modified for this log as follows:

Procedure No. RMRS/OPS-PRO.101

Materials amounts are estimated by % volume instead of % weight.

Revision 0

(1) Badly broken core, accurate footage measurements not possible.

Date effective: 12/31/98

(2) Core breaks cannot be matched, accurate footage measurements not possible.

Page 27 of 28

ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE BOREHOLE LOG

PAGE 1 OF 1

Borehole Number: CP38-088
 Location - North: _____ East: _____
 Date: 3/30/05
 Geologist: Z. TUSA
 Drilling Equip.: Lynco's Drilling Systems AP-1000

Surface Elevation: _____
 Area: 900-11 903 Rd
 Total Depth: _____
 Company: URS Project No.: GR210600
 Sample Type: Split-Spoon

RMRS LOGGING SUPERVISOR

APPROVAL _____

DATE _____

TOP/BOTTOM OF CORE IN BOX	TOP/BOTTOM OF INTERVAL	FEET OF CORE IN INTERVAL (FIELD MEASUREMENT)	SAMPLE NUMBER	FRACTURE ANGLE	BEDDING ANGLE	GRAIN SIZE DISTRIBUTION	USCS SYMBOL	DEPTH IN FEET	SOIL LITHOLOGIC LOG	SAMPLE DESCRIPTION
								20		Begin 3/30/05 0827
	21.0'									Advanced without sampling via handwall, reverse-circulation percussion drilling from 0' to 21' ft. (gravel for cuttings), then sample as indicated below.
	21.8	0.8					GP	21		21-21.8' : Sandy gravel w/ clay, strong brown 7.5YR 5/8, coarse, poorly graded, subround, moist, quartzite.
	22.0	X					X	22		21.8-22.0 no sample
		1.0					GP			22.0-23.0 Sandy gravel w/ clay, as above.
	23.0		23.0					23		23.0-23.7 Sandy gravel w/ clay, as above.
		2.0	23.7				GP			
			F							
			24.1				CL	24		23.7-24.1 Clay, Itelino grey 5Y 6/2, mottled yellowish brown 10YR 5/8, stiff, moist [Weathered Bedrock]
	25.0	TD						25		24.1-25.0 TD NO RECOVERY

NOTES: General: USCS is modified for this log as follows:

Materials amounts are estimated by % volume instead of % weight.

(1) Badly broken core, accurate footage measurements not possible.

(2) Core breaks cannot be matched, accurate footage measurements not possible.

Procedure No. RMRS/OPS-PRO.101

Revision 0

Date effective: 12/31/98

Page 27 of 28

ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE BOREHOLE LOG

PAGE 1 OF 2Borehole Number: CP38-089Surface Elevation: SurveyLocation - North: 749132.9 East: 2085841Area: 900 - 11 903 p.d.Date: 3/10/05

Total Depth: _____

Geologist: Z TUTACompany: URSProject No.: GR210 100Drilling Equip.: AMS POWER PROBE 9620 TITANSample Type: AMS DUAL TUBE

RMRS LOGGING SUPERVISOR

APPROVAL _____

DATE _____

TOP/BOTTOM OF CORE IN BOX	TOP/BOTTOM OF INTERVAL	FEET OF CORE IN INTERVAL (FIELD MEASUREMENT)	SAMPLE NUMBER	FRACTURE ANGLE	BEDDING ANGLE	GRAIN SIZE DISTRIBUTION	USCS SYMBOL	DEPTH IN FEET	SOIL LITHOLOGIC LOG	SAMPLE DESCRIPTION
		3.2 4.0					F _L	1		0-3.0 Gravelly sand, dark brown 10YR 8/3, fine-coarse, well-graded, subround, quartz, slightly moist. [FILL]
			3.0 A				SW	2		
			4.0				ML	3		3.0-4.0 Gravelly silt, very pale brown 10YR 8/4, stiff soft, slightly moist, w/ coarse subround quartz gravel
		4.0 4.0	B				Gm	4		4.0-10.5 Silty gravel w/ sand pinkish gray 7.5YR 7/2, coarse, poorly graded, subround dry.
			6.0					5		
								6		
								7		
								8		
		4.0 4.0						9		

NOTES: General: USCS is modified for this log as follows:

Materials amounts are estimated by % volume instead of % weight.

(1) Badly broken core, accurate footage measurements not possible.

(2) Core breaks cannot be matched, accurate footage measurements not possible.

Procedure No. RMRS/OPS-PRO.101

Revision 0

Date effective: 12/31/98

Page 27 of 28

ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE BOREHOLE LOG

PAGE 2 OF 2Borehole Number: CP38-089Surface Elevation: SURVEYLocation - North: 749137.9 East: 2085841Area: 700-11 (903 Pad)Date: 3/10/05

Total Depth: _____

Geologist: Z TUTACompany: URSProject No.: GR210100Drilling Equip.: AMS POWERPROBE 9620 TITANSample Type: AMS DUAL TUBE

RMRS LOGGING SUPERVISOR

APPROVAL _____

DATE _____

TOP/BOTTOM OF CORE IN BOX	TOP/BOTTOM OF INTERVAL	FEET OF CORE IN INTERVAL (FIELD MEASUREMENT)	SAMPLE NUMBER	FRACTURE ANGLE	SEDDING ANGLE	GRAIN SIZE DISTRIBUTION	USCS SYMBOL	DEPTH IN FEET	SOIL LITHOLOGIC LOG	SAMPLE DESCRIPTION
							GM			
							CL	11		
								12		
	12.0	3.8 4.0						13		
							GP	14		
								15		
							CL	16		
	16.0	2.0 2.0						17		
								18		
	18.0	T.D.	18.0							

10.5 - 13.3 Sandy clay with gravel, olive gray ~~5Y~~ 5Y 6/2, mottled w/ yellowish brown 10YR 5/6, very stiff, with fine sand, qtz, w/ fine to coarse gravel, granitic, slightly moist.

13.3 - 15.1 ~~clayey~~ sandy gravel w/ clay, coarse, subround, poorly graded, yellowish red 5YR 5/6, slightly moist.

15.1 - 18.0 Sandy clay, olive gray 5Y 6/2 mottled with yellowish brown 10YR 5/6, very stiff, with fine qtz sand, slightly moist. w/ sparse, fine gravel. Angular fragments of black carbonaceous material at 17' up to 5mm max dimension. [Refusal at 18 Ft; offset 5' w/ push solid qt to refusal at 8.8 Ft, & sampler to refusal at 18.0 Ft.]

NOTES: General: USCS is modified for this log as follows:

Materials amounts are estimated by % volume instead of % weight.

(1) Badly broken core, accurate footage measurements not possible.

(2) Core breaks cannot be matched, accurate footage measurements not possible.

Procedure No. RMRS/OPS-PRO.101

Revision 0

Date effective: 12/31/98

Page 27 of 28

ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE BOREHOLE LOG

PAGE 1 OF 1

Borehole Number: CP38-089
 Location - North: _____ East: _____
 Date: 3-24-05
 Geologist: Z. Tata
 Drilling Equip.: Layne AR-1000

Surface Elevation: _____
 Area: 900-11 (90380)
 Total Depth: 24.5'
 Company: URS Project No.: GR210100
 Sample Type: split spoon

RMRS LOGGING SUPERVISOR
APPROVAL _____

DATE _____

TOP/BOTTOM OF CORE IN BOX	TOP/BOTTOM OF INTERVAL	FEET OF CORE IN INTERVAL FIELD MEASUREMENT	SAMPLE NUMBER	FRACTURE ANGLE	BEDDING ANGLE	GRAIN SIZE DISTRIBUTION	USCS SYMBOL	DEPTH IN FEET	SOIL/ LITHOLOGIC LOG	SAMPLE DESCRIPTION
										Begin 3/29/05 1043
	19.0							19		Advanced without sampling dual-wall, reverse circulation percussion drilling from 0 to (gravel percentages), then sample as indicated.
		0.75 0.75					GP			19.0 - 19.75 Sandy gravel w/ clay, reddish yellow 7.5 pc 6/8, coarse, poorly graded, subrounded, moist.
	19.75							20		20.0 - 20.5 Sandy gravel w/ clays as above.
	20.0	0.5 0.5					GP			
	20.5							21		21.0 - 21.7 Sandy gravel w/ clay, as above.
	21.0	0.7 0.7	21.5				GP			
	21.7		D					22		22.2 - 22.5 Sandy gravel w/ clay, as above.
	22.0	0.5 2.0	22.5				GP			22.5 - 22.8 Clay, lt olive gray 5Y6/2, mottled with yellowish brown 10YR5/8, stiff, wet. [w/ Bedrock]
			E				CL	23		23.0 - 23.5 Clay, as above [w/ Bedrock]
			23.5							
								24		24.0 - 24.5 No recovery
	24.5	TD								

NOTES: General: USCS is modified for this log as follows:

Materials amounts are estimated by % volume instead of % weight.

(1) Badly broken core, accurate footage measurements not possible.

(2) Core breaks cannot be matched, accurate footage measurements not possible.

Procedure No. RMRS/OPS-PRO.101

Revision 0

Date effective: 12/31/98

Page 27 of 28

ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE BOREHOLE LOG

PAGE 1 OF 3Borehole Number: CP38-090Surface Elevation: SurveyLocation - North: 799158.9 East: 2085851Area: 700-11 (903 Pad)Date: 3/10/05

Total Depth: _____

Geologist: Z TUTACompany: URSProject No.: GR210100Drilling Equip.: AMS POWERPROBE 9620 TITANSample Type: AMS DUAL TUBE

RMRS LOGGING SUPERVISOR

APPROVAL _____

DATE _____

TOP/BOTTOM OF CORE IN BOX	TOP/BOTTOM OF INTERVAL	FEET OF CORE IN INTERVAL (FIELD MEASUREMENT)	SAMPLE NUMBER	FRACTURE ANGLE	SEDIMENT ANGLE	GRAIN SIZE DISTRIBUTION	USCS SYMBOL	DEPTH IN FEET	SOIL LITHOLOGIC LOG	SAMPLE DESCRIPTION
		2.9 / 4.0				FILL				Begin 0820
			3.3	(32)				1		0-3.3 Gravelly sand, dark brown, 10 YR 3/3; Fine-coarse, well-graded, subround, quartz, slightly moist. [FILL]
			A	(32)		GP		2		
	4.0	4.0 / 4.0	4.0	(32)				3		3.3-8.0 Sandy gravel w/ clay, light gray 7.5 YR 7/1 to light brown 7.5 YR 6/4 Coarse, poorly graded, subround, quartzite, dry.
			B	(32)				4		
								5		
			6.0					6		
								7		
	8.0	4.0 / 4.0				GP		8		8.0-9.8 Sandy gravel w/ clay, as above
								9		
								10		9.8 [see next page]

NOTES: General: USCS is modified for this log as follows:

Materials amounts are estimated by % volume instead of % weight.

(1) Badly broken core, accurate footage measurements not possible.

(2) Core breaks cannot be matched, accurate footage measurements not possible.

Procedure No. RMRS/OPS-PRO.101

Revision 0

Date effective: 12/31/98

Page 27 of 28

ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE BOREHOLE LOG

PAGE 2 OF 3

Borehole Number: CP38-090Surface Elevation: SurveyLocation - North: 749158.9 East: 2085851Area: 700-11 (903 Pad)Date: 3/10/05

Total Depth: _____

Geologist: Z TutaCompany: URSProject No.: GR210100Drilling Equip.: AMS POWERPROBE 9620 TITANSample Type: AMS DUAL TUBE

RMRS LOGGING SUPERVISOR

APPROVAL _____

DATE _____

TOP/BOTTOM OF CORE IN BOX	TOP/BOTTOM OF INTERVAL FEET OF CORE IN INTERVAL MEASUREMENT	SAMPLE NUMBER	FRACTURE ANGLE	BEDDING ANGLE	GRANULE DISTRIBUTION	USCS SYMBOL	DEPTH IN FEET	SOIL LITHOLOGIC LOG	SAMPLE DESCRIPTION
						SP	10		9.8 - 11.3 Gravelly sand, yellowish red 5YR 5/6, medium, subangular, poorly graded, qtz/feldspar, slightly moist, w/ some silt/clay (<10%).
	12.0	1.0 / 4.0				GP	11		
							12		11.3 - 13.0 Sandy gravel with clay, yellow 10YR 8/6 to reddish yellow 7.5YR 6/6, coarse, poorly graded, subangular, quartzite, dry.
							13		
							14		13.0 - 16.0 NO RECOVERY
							15		
	16.0	3.7 / 4.0				GP	16		16.0 - 18.5. Sandy gravel with clay, light gray 2.5Y 7/2, coarse, poorly graded, subangular, qtzite/granite, dry.
							17		
							18		
						GC	19		18.5 - 20.0 Clayey gravel with sand, strong brown 7.5YR 5/8, coarse poorly graded, subangular, qtzite/granite, slightly moist.
							20		

NOTES: General: USCS is modified for this log as follows:

Materials amounts are estimated by % volume instead of % weight.

(1) Badly broken core, accurate footage measurements not possible.

(2) Core breaks cannot be matched, accurate footage measurements not possible.

Procedure No. RMRS/OPS-PRO.101

Revision 0

Date effective: 12/31/98

Page 27 of 28

ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE BOREHOLE LOG

PAGE 3 OF 3

Borehole Number: C038-090
Location - North: Surveyed East: Surveyed
Date: 3/10/05
Geologist: A. Pacheco Z. T. L. A.
Drilling Equip: Power Probe 9620 TITAN

Surface Elevation: Surveyed
Area: 903 Pad
Total Depth: 24.0 ft
Company: URS Project No.: GR240100
Sample Type: Dual Tube

RMRS LOGGING SUPERVISOR

APPROVAL

DATE

TOP POSITION OF CORE IN BOX	INTERVAL OF FEET OF CORE IN INTERVAL MEASURED	SAMPLE NUMBER	FRACURE ANGLE	SECTIONS ANGLE	GRAIN SIZE DISTRIBUTION	USCS SYMBOL	DEPTH IN FEET	LOG	SAMPLE DESCRIPTION
	2.3						20		20 - 21 NO RECOVERY
	4.0	21.0				GC	21		21 - 22 Clayey gravel w/ sand as above 18.5 - 20.0.
		C					22		22 - 23.3 Clay, dark gray 5/4, mottled with olive brown 2.5/5/6, very stiff, moist.
		22.0				CL			[WEATHERED BEDROCK]
		D							23.3 - 27 NO RECOVERY
		23.0							
	24.0	TD					24		24.0 T.D.

NOTES: General: USCS is modified for this log as follows:

Materials amounts are estimated by % volume instead of % weight.

(1) Badly broken core, accurate footage measurements not possible.

(2) Core breaks cannot be matched, accurate footage measurements not possible.

Procedure No. RMRS/OPS-PRO.101

Revision 0

Date effective: 12/31/98

Page 27 of 28

ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE BOREHOLE LOG

PAGE 1 OF 2

Borehole Number: CP39-059Location - North: Surveyed East: SurveyedDate: 2-28-05Geologist: A. PachecoDrilling Equip.: Power ProbeSurface Elevation: SurveyedArea: 903 PadTotal Depth: 18.0 ftCompany: URSSample Type: Dual Tube

Project No.: _____

RMRS LOGGING SUPERVISOR

APPROVAL _____

DATE _____

TOP OF CORE IN BOX	TOP OF CORE IN BOX	TOP OF CORE IN BOX	FEET OF CORE IN INTERVAL MEASUREMENT	SAMPLE NUMBER	FRACURE ANGLE	BEDDING ANGLE	GRAIN SIZE DISTRIBUTION	USCS SYMBOL	DEPTH IN FEET	DEPTH LITHOLOGIC LOG	SAMPLE DESCRIPTION
								GM	0		0-3.2 Sand-silt-clay mixture Dark reddish brown SYR 3/4 poorly-graded, subangular quartzite and granite (0.05 in) dry [Fill]
									1		
									2		
									3		
4.0	4.0	4.0	3.2	A voc				GC	3.2		3.2-4.2 Clayey Gravel Lt. reddish brown SYR 6/4 poorly-graded, subangular quartzite (0.1 in) stiff, dry
			4.5	B voc				SC	4		4.2-4.4 Clayey Sand dk. greenish gray Gley 1 1/2 fine, subrounded, dry
			6.5					GC	5		4.4-7.5 Clayey Gravel as above
									6		
7.5	7.5	3.5							7		
									8		
									9		
									10		

NOTES: General: USCS is modified for this log as follows:

Materials amounts are estimated by % volume instead of % weight.

(1) Badly broken core, accurate footage measurements not possible.

(2) Core breaks cannot be matched, accurate footage measurements not possible.

Procedure No. RMRS/OPS-PRO.101

Revision 0

Date effective: 12/31/98

Page 27 of 28

ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE BOREHOLE LOG

PAGE 2 OF 2Borehole Number: CP39-059Location - North: Surveyed East: SurveyedDate: 2-28-05Geologist: A. PachecoDrilling Equip.: Power probeSurface Elevation: SurveyedArea: 903 PadTotal Depth: 18.0 ftCompany: URS

Project No.: _____

Sample Type: Dual TubeRMRS LOGGING SUPERVISOR
APPROVAL _____

DATE _____

TOP OF CORE IN SOI	TOP OF CORE IN SOI	INTERVAL FEET OF CORE IN INTERVAL MEASUREMENT	SAMPLE NUMBER	FRASURE ANGLE	SECOND ANGLE	GRAIN SIZE DISTRIBUTION	USCS SYMBOL	DEPTH IN FEET	SYMBOL LOG	SAMPLE DESCRIPTION
11.5	11.5	4.0	Composite & screen 10-18'				GC	11.0		Clayey Gravel as above 10.5-11.0 Less Gravel grading into 11.0 Gravelly Clay
							CL	12.0		12.0-12.5 Crushed Gravel quartzite, gray 7.5YR 6/1, subangular
								12.5		12.5-13.0 Gravelly Clay reddish brown 5YR 4/4
								13.0		13.0 less gravel, grading into clay
14.5	14.5	4.0						14.2		14.2 Gravel, quartzite (0.1 in), subangular dark gray 7.5YR 4/1
								14.3		14.3-16.0 Gravelly Clay brown 7.5YR 4/4
								16.0		16.0 Gravel, quartzite (0.1 in), subangular dark gray 7.5YR 4/1
								16.1		16.1-17.0 Gravelly Clay
								16.9		16.9 Same as above with gravel
								17.0		17.0 Silty Sandstone dark reddish brown 2.5YR 3/4 to brown 7.5YR 4/4 to pale red 2.5YR 7/2
18.0	18.0	3.5						18.0		TD = 18.0'
								19.0		Gamma screen of composite samples resulted in 0.0 pCi/g Americium. Excess cuttings permitted to go back in hole.

NOTES: General USCS is modified for this log as follows:

Materials amounts are estimated by % volume instead of % weight.

(1) Badly broken core, accurate footage measurements not possible.

(2) Core breaks cannot be matched, accurate footage measurements not possible.

Procedure No. RMRS/OPS-PRO.101

Revision 0

Date effective: 12/31/98

Page 27 of 28

ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE BOREHOLE LOG

PAGE 1 OF 2Borehole Number: CP39-059Surface Elevation: SurveyedLocation - North: Surveyed East: SurveyedArea: 903 PadDate: 2-28-05Total Depth: 18.0 ftGeologist: A. PachecoCompany: URSDrilling Equip.: Power ProbeSample Type: Dual Tube

Project No.: _____

RMRS LOGGING SUPERVISOR

APPROVAL _____

DATE _____

TOP POSITION OF CORE IN BOX	TOP POSITION OF INTERVAL	FEET OF CORE IN INTERVAL FIELD MEASUREMENT	SAMPLE NUMBER	FRACURE ANGLE	BEDDING ANGLE	GRAIN SIZE DISTRIBUTION	USCS SYMBOL	DEPTH IN FEET	SOIL/ LITHOLOGIC LOG	SAMPLE DESCRIPTION
							GM	0		0-3.2 Sand-silt-clay mixture Dark reddish brown 5YR 5/4 poorly-graded, subangular quartzite and granite (0.05 in) dry [Fill]
			3.2					1		
								2		
								3		
4.0	4.0	4.0	A v/c				GC	3.2		3.2-4.2 Clayey Gravel Lt. reddish brown 5YR 6/4 poorly-graded, subangular quartzite (0.1 in) stiff, dry
			4.5				SC	4		
			B v/c				GC	4.2		4.2-4.4 Clayey Sand dk. greenish gray Gley 1 4/1 fine, subrounded, dry
								5		4.4-7.5 Clayey Gravel as above
								6		
			6.5					7		
7.5	7.5	3.5	Composite Screen 0-10'					8		
								9		
								10		

NOTES: General: USCS is modified for this log as follows:

Materials amounts are estimated by % volume instead of % weight.

(1) Badly broken core, accurate footage measurements not possible.

(2) Core breaks cannot be matched, accurate footage measurements not possible.

Procedure No. RMRS/OPS-PRO.101

Revision 0

Date effective: 12/31/98

Page 27 of 28

ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE BOREHOLE LOG

PAGE 2 OF 2Borehole Number: CP39-059Location - North: Surveyed East: SurveyedDate: 2-28-05Geologist: A. PachecoDrilling Equip.: PowerprobeSurface Elevation: SurveyedArea: 903 PadTotal Depth: 18.0 ftCompany: URS

Project No.: _____

Sample Type: Dual TubeRMRS LOGGING SUPERVISOR
APPROVAL _____

DATE _____

TOP POSITION OF CORE IN BOX	TOP POSITION OF INTERVAL	FEET OF CORE IN INTERVAL (FIELD MEASUREMENT)	SAMPLE NUMBER	FRACURE ANGLE	SEEDING ANGLE	GRAIN SIZE DISTRIBUTION	USCS SYMBOL	DEPTH IN FEET	SYMBOL LITHOLOGIC LOG	SAMPLE DESCRIPTION
11.5	11.5	4.0	Composite & screen 10-18'				GL	11		Clayey Gravel as above 10.5-11.0 Less Gravel grading into 11.0 Gravelly clay
							CL	12		12.0-12.5 Crushed Gravel quartzite, gray 7.5YR 6/1, subangular
								13		12.5-13.0 Gravelly clay reddish brown 5YR 4/4
								14		13.0 less gravel, grading into clay
14.5	14.5	4.0						15		14.2 Gravel, quartzite (0.1 in), subangular dark gray 7.5YR 4/1
								16		14.3-16.0 Gravelly clay brown 7.5YR 4/4
								17		16.0 Gravel, quartzite (0.1 in), subangular dark gray 7.5YR 4/1
								18		16.1-17.0 Gravelly clay
18.0	18.0	3.5						19		16.9 Same as above with gravel
								20		17.0 Silty Sandstone dark reddish brown 2.5YR 3/4 to brown 7.5YR 4/4 to pale red 2.5YR 7/2
										TD=18.0'
										Gamma screen of composite samples resulted in 0.0 pCi/g Americium. Excess cuttings permitted to go back in hole.

NOTES: General: USCS is modified for this log as follows:

Materials amounts are estimated by % volume instead of % weight.

(1) Badly broken core, accurate footage measurements not possible.

(2) Core breaks cannot be matched, accurate footage measurements not possible.

Procedure No. RMRS/OPS-PRO.101

Revision 0

Date effective: 12/31/98

Page 27 of 28

ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE BOREHOLE LOG

PAGE 1 OF 2Borehole Number: CP39-060Location - North: Surveyed East: SurveyedDate: 3-1-05Geologist: A. PachecoDrilling Equip.: Power ProbeSurface Elevation: SurveyedArea: 903 PadTotal Depth: 16.8'Company: URSSample Type: Dial Tube

Project No.: _____

RMRS LOGGING SUPERVISOR

APPROVAL _____

DATE _____

TOP OF CORE IN BOX	TOP OF CORE IN BOX	INTERVAL FEET OF CORE IN INTERVAL MEASUREMENTS	SAMPLE NUMBER	FRACTURE ANGLE	SEDDING ANGLE	GRAIN SIZE DISTRIBUTION	USCS SYMBOL	DEPTH IN FEET	RMRS LITHOLOGIC LOG	SAMPLE DESCRIPTION
							GM	0-3.4		Sand-silt-clay mixture with gravel Reddish brown SYR 4/3 poorly-graded, subangular gravels granitic to quartzite (0.05 in) medium, subrounded quartz sand slightly moist [Fill]
4.0	4.0	4.0	3.4 8 vac				GC	3.4-7.5		Clayey Gravel with sand pinkish white SYR 8/2 stiff, sand-subrounded, medium, quartz gravel-subangular (0.1 in), quartzite slightly moist [Alluvium]
			4.5 C					4-6		grading into larger gravels (0.1 in - 0.15 in in length) subangular, quartzite gray SYR 5/1
6.0	6.0	3.5	6.2 composite gamma screen P-10					6-7.5		No Recovery
							GC	7.5-12.0		same as 3.4-7.5 with larger gravels as in ~ 6-7.5'
								8-10		

NOTES: General USCS is modified for this log as follows:

Materials amounts are estimated by % volume instead of % weight.

(1) Badly broken core, accurate footage measurements not possible.

(2) Core breaks cannot be matched, accurate footage measurements not possible.

Procedure No. RMRS/OPS-PRO.101

Revision 0

Date effective: 12/31/98

Page 27 of 28

ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE BOREHOLE LOG

PAGE 2 OF 2Borehole Number: CP39-060Location - North: Surveyed East: SurveyedDate: 3-1-05Geologist: A PachecoDrilling Equip.: Pneum ProbeSurface Elevation: SurveyedArea: 903 PadTotal Depth: 16.5' 16.8'Company: URS

Project No.: _____

Sample Type: Dual Tube

RMRS LOGGING SUPERVISOR

APPROVAL _____

DATE _____

TOP POSITION OF CORE IN BOX	TOP POSITION OF INTERVAL	FEET OF CORE IN INTERVAL FIELD MEASUREMENT	SAMPLE NUMBER	FRACTURE ANGLE	SECOND ANGLE	GRAIN SIZE DISTRIBUTION	USCS SYMBOL	DEPTH IN FEET	SRU LITHOLOGIC LOG	SAMPLE DESCRIPTION
							GC			see above
12.0	12.0	4.0	11.7 Bvoc 11.9					11		
								12		11.7-11.9 Staining Very DK-greenish gray Gley 2 3/1 Sandy Gravel 12-13.0 No Recovery coarse, subrounded slough from above quartz, trace clay soft, slightly moist.
							CL	13		13.0-14.0 Sandy Clay with trace organics reddish brown SYR 5H/v.dk. [Alluvium] poorly-graded, medium subrounded sand, quartz, slightly moist
								14		14.0-14.5 Gravelly Clay, pinkish gray SYR 6/2 poorly-graded, (gravel 0.1 in) quartzite, subangular dk. gray SYR 4/1, slightly moist [Alluvium] 14.5-15.5 No Recovery [Alluvium] AP3-05
15.5	15.5	2.0	15.8 E				CL	15		15.5-16.3 Sandy Clay [Alluvium] lt. brownish gray 10YR 6/2 [Alluvium] coarse-medium subrounded quartz sand stiff, slightly moist, trace gravel 0.
16.5	16.5	1.0	16.8 F					16		16.3-16.5 Silty Sandstone weathered (completely), mod. strong lt. brownish gray 10YR 6/2 TD=16.8'
			16.8					17		
								18		
								19		
								20		

NOTES: General USCS is modified for this log as follows:

Materials amounts are estimated by % volume instead of % weight.

(1) Badly broken core, accurate footage measurements not possible.

(2) Core breaks cannot be matched, accurate footage measurements not possible.

Procedure No. RMRS/OPS-PRO.101

Revision 0

Date effective: 12/31/98

Page 27 of 28

PAGE 1 OF 2

Sample Type: Dual Tube Project No.:

DATE _____

NOTES: General: USCS is modified for this log as follows:
Materials amounts are estimated by % volume instead of % weight.
(1) Badly broken core, accurate footage measurements not possible.
(2) Core breaks cannot be matched, accurate footage measurements not possible.

Procedure No. RMRS/OPS-PRO.101
Revision 0
Date effective: 12/31/98
Page 27 of 28

ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE BOREHOLE LOG

PAGE 2 OF 2

Borehole Number: CP29-060Location - North: Surveyed East: SurveyedDate: 3-1-05Geologist: A PachecoDrilling Equip.: Pneum ProbeSurface Elevation: SurveyedArea: 903 PadTotal Depth: 16.5' - 16.8'Company: URS

Project No.: _____

Sample Type: Dual TubeRMRS LOGGING SUPERVISOR
APPROVAL _____

DATE _____

TOP OF CORE IN BOX	TOP OF CORE IN BOX	INTERVAL FEET OF CORE IN INTERVAL MEASUREMENT	SAMPLE NUMBER	FRACTURE ANGLE	SECOND ANGLE	OPEN SIZE DISTRIBUTION	USCS SYMBOL	DEPTH IN FEET	SPILL LITHOLOGIC LOG	SAMPLE DESCRIPTION
							GC			see above
12.0	12.0	4.0	11.7 Dvoc 11.9					11		
								12		11.7-11.9 Staining Very DK-greenish gray Gley 2 3/1 Sandy Gravel 12-13.0 No Recovery coarse, subrounded slough from above quartz, trace clay soft, slightly moist.
							CL	13		13.0 - 14.0 Sandy Clay with trace organics reddish brown SYR 5/4/v.dk. [Alluvium] poorly-graded, medium subrounded sand, quartz, slightly moist
								14		14.0-14.5 Gravelly clay, pinkish gray SYR 6/2 poorly-graded, gravels (0.1 in) quartzite, subangular dk gray SYR 4/1, slightly moist 14.5-15.5 No Recovery [Alluvium] Apr 3-1-05
15.5	15.5	2.0	15.8 E				CL	15		15.5-16.3 Sandy Clay [Alluvium] 14. brownish gray 10YR 6/2 coarse-medium subrounded quartz sand stiff, slightly moist, trace gravel 0.
16.5	16.5	1.0	16.3 F					16		16.3-16.5 Silty Sandstone weathered (completely), mod. strong 14. brownish gray 10YR 6/2
			16.6					17		TD=16.8'
								18		
								19		
								20		

NOTES: General: USCS is modified for this log as follows:

Materials amounts are estimated by % volume instead of % weight.

(1) Badly broken core, accurate footage measurements not possible.

(2) Core breaks cannot be matched, accurate footage measurements not possible.

Procedure No. RMRS/OPS-PRO.101

Revision 0

Date effective: 12/31/98

Page 27 of 28

ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE BOREHOLE LOG

PAGE 1 OF 2Borehole Number: CP39-061Location - North: Surveyed East: SurveyedDate: 3-1-05Geologist: A. PachecoDrilling Equip.: Power ProbeSurface Elevation: SurveyedArea: 903 PadTotal Depth: 17.5'Company: URS

Project No.: _____

Sample Type: dual tubeRMRS LOGGING SUPERVISOR
APPROVAL _____

DATE _____

TOP/BOTTOM OF CORE IN SOI	TOP/BOTTOM OF INTERVAL	FEET OF CORE IN INTERVAL FIELD MEASUREMENT	SAMPLE NUMBER	FRACTURE ANGLE	SECOND ANGLE	GRAIN SIZE DISTRIBUTION	USCS SYMBOL	DEPTH IN FEET	SRM LITHOLOGIC LOG	SAMPLE DESCRIPTION
							GM	0		0-3.5 Sand-silt-clay mixture with gravel dark yellowish brown 10YR 4/1 poorly-graded sand-med.-coarse gr. subrounded gravel-subangular, quartzite (0.1 in)
								1		
								2		
								3		[Fill]
4.0	4.0	4.0	8.5 B voc				GC	4		3.5-12.0 Clayey Gravel yellowish red 5YR 5/6 to reddish gray 5YR 5/2 to gray 6/1 gravel-subangular quartzite poorly-graded clay-stiff, trace sand-med., slightly moist subrounded
			4.5 C voc					5		[Alluvium]
								6		
			6.0					7		
								8		
8.0	8.0	4.0						9		Clayey Gravel as above with pale red 10R 6/3
								10		

NOTES: General: USCS is modified for this log as follows:

Materials amounts are estimated by % volume instead of % weight.

(1) Badly broken core, accurate footage measurements not possible.

(2) Core breaks cannot be matched, accurate footage measurements not possible.

Procedure No. RMRS/OPS-PRO.101

Revision 0

Date effective: 12/31/98

Page 27 of 28

ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE BOREHOLE LOG

PAGE 2 OF 2

Borehole Number: CP39-061Location - North: Surveyed East: SurveyedDate: 3-1-05Geologist: A PachecoDrilling Equip.: Power ProbeSurface Elevation: SurveyedArea: 903 PadTotal Depth: 17.5'Company: URSSample Type: Dual Tube

Project No.: _____

RMRS LOGGING SUPERVISOR
APPROVAL _____

DATE _____

TOP POSITION OF CORE IN BOH	TOP POSITION OF INTERVAL	FEET OF CORE IN INTERVAL FIELD MEASUREMENT	SAMPLE NUMBER	FRACTURE ANGLE	BEDDING ANGLE	GRAIN SIZE DISTRIBUTION	USCS SYMBOL	DEPTH IN FEET	SPH/ LITHOLOGIC LOG	SAMPLE DESCRIPTION
							GC			Clayey Gravel as above
12.0	12.0	4.0						11		11.0 - 11.5 Sandy Clayey Gravel 5% more sand - coarse gr, subangular, quartz with trace organics [Alluvium]
								12		11.5 - 12.0 Clayey Gravel as above
								13		12.0 - 13.2 No Recovery, slough
							GC			13.2 - 13.7 Clayey Gravel [Alluvium] as above
			14.2 D voc				CL	14		13.7 - 14.7 Gravelly Clay yellowish red gravel - (0.01 to 0.05 in) subangular quartzite poorly graded [Colluvium] clay - stiff, slightly moist
			14.7 E voc				CL	15		14.7 - 16.0 Sandy Clay with trace gravel yellowish red SYR 4/6 poorly graded
16.0	16.0	2.8	15.2					16		med - coarse sand subrounded quartz gravel < 5%, 0.03 in clay - stiff, slightly moist
			16.8 F voc					17		16.0 - 16.8 same as above 14.7 - 16.0
17.5	17.5	1.5	17.3					18		16.8 - 17.5 Gravelly Clay [Colluvium] gravel - (0.01 to 0.05 in) as above 13.7 - 14.7
								19		
								20		TD = 17.5' Refusal

NOTES: General: USCS is modified for this log as follows:

Materials amounts are estimated by % volume instead of % weight.

(1) Badly broken core, accurate footage measurements not possible.

(2) Core breaks cannot be matched, accurate footage measurements not possible.

Procedure No. RMRS/OPS-PRO.101

Revision 0

Date effective: 12/31/98

Page 27 of 28

ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE BOREHOLE LOG

PAGE 1 OF 1Borehole Number: CP39-061

Surface Elevation: _____

Location - North: 749170.9 East: 2085867Area: 900-11 (903 Pad)Date: 3-29-05

Total Depth: _____

Geologist: 2 TATACompany: URSProject No.: CR 210100Drilling Equip.: Lynne Weston AP-1000Sample Type: split spoon

RMRS LOGGING SUPERVISOR

APPROVAL _____

DATE _____

TOP/BOTTOM OF CORE IN BOX	TOP/BOTTOM OF INTERVAL	FEET OF CORE IN INTERVAL MEASUREMENT	SAMPLE NUMBER	FRACTURE ANGLE	BEDDING ANGLE	GRAIN SIZE DISTRIBUTION	USCS SYMBOL	DEPTH IN FEET	SOIL LITHOLOGIC LOG	SAMPLE DESCRIPTION
								18		Begin 3-29-05 0925
								19		[Advance dual-wall, reverse-circulation drilling from 0 to 19.5' without sampling - cuttings indicate gravel] [water added to air throughout drilling]
	19.5	19.5						19.5		19.5-20.0 Sandy gravel, reddish- yellow 7.5 YR 6/6 coarse, medium grained, subround mortar
		1.5 / 1.5	G 19.5 H 20.5				GP	20		
	21.0							21		20.0-21.0 T.D. Clay light olive grey 5Y 6/2 mottled with yellowish brown 10YR 5/8, very st. ff, moist.* [Weathered Bedrock]
	TD							22		
								23		
								24		

NOTES: General: USCS is modified for this log as follows:

Materials amounts are estimated by % volume instead of % weight.

(1) Badly broken core, accurate footage measurements not possible.

(2) Core breaks cannot be matched, accurate footage measurements not possible.

Procedure No. RMRS/OPS-PRO.101

Revision 0

Date effective: 12/31/98

Page 27 of 28

ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE BOREHOLE LOG

PAGE 1 OF 2Borehole Number: CP39-062Location - North: Surveyed East: SurveyedDate: 3-1-05Geologist: A PachecoDrilling Equip.: Power ProbeSurface Elevation: SurveyedArea: 903 PadTotal Depth: 11.5'Company: URS

Project No.: _____

Sample Type: dual tubeRMRS LOGGING SUPERVISOR
APPROVAL _____

DATE _____

TOP POSITION OF CORE IN BOX	TOP POSITION OF INTERVAL FEET OF CORE IN INTERVAL IN FIELD MEASUREMENT	SAMPLE NUMBER	FRACURE ANGLE	SPACING ANGLE	GRANULAR DETERMINATION	USCS SYMBOL	DEPTH IN FEET	SYMBOL LITHOLOGIC LOG	SAMPLE DESCRIPTION
						GM	0		0-3.4
							1		Sand-silt-clay mixture with gravel dark reddish brown SYR 3/3 poorly-graded gravel-subangular quartzite, granitic (0.1in)
							2		coarse-medium sand, subrounded soft, slightly moist
							3		[Fill]
4.0	4.0	3.4 B ₁₀₀				CL	4		3.4-4.0 Gravelly Clay [Alluvium] lt. gray 10YR 7/2 poorly-graded gravel-subangular quartzite (0.05in)
		4.5 C ₁₀₀				EL	5		soft, moist
							6		4.0-4.5 Gravelly Clay [Alluvium] 4.5-12.0 Clayey Gravel gravel(0.1in) quartzite dark gray 7.5YR subangular clay-stiff, slightly moist [Alluvium]
8.0	8.0	6.0 Composite & screen 0-10'					7		
							8		
							9		
							10		

NOTES: General: USCS is modified for this log as follows:

Materials amounts are estimated by % volume instead of % weight.

(1) Badly broken core, accurate footage measurements not possible.

(2) Core breaks cannot be matched, accurate footage measurements not possible.

Procedure No. RMRS/OPS-PRO.101

Revision 0

Date effective: 12/31/98

Page 27 of 28

ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE BOREHOLE LOG

PAGE 2 OF 2

Borehole Number: CP39-062Location - North: Surveyed East: SurveyedDate: 3-1-05Geologist: A PachecoDrilling Equip.: Power ProbeSurface Elevation: SurveyedArea: 903 PadTotal Depth: 19.5'Company: VRS

Project No.: _____

Sample Type: dual tube

RMRS LOGGING SUPERVISOR

APPROVAL _____

DATE _____

TOP OF CORE IN BOR	TOP OF CORE OF INTERVAL	FEET OF CORE IN INTERVAL MEASUREMENT	SAMPLE NUMBER	FRACTURE ANGLE	SEEDING ANGLE	GRAIN SIZE DISTRIBUTION	USCS SYMBOL	DEPTH IN FEET	SOIL LITHOLOGIC LOG	SAMPLE DESCRIPTION
							GC			Clayey Gravel as above [Alluvium]
								11		
12.0	12.0	4.0						12		
								13		
								14		grading into
							CL	15		14.5-15.0 Sandy Clay with trace gravel grading into [Alluvium]
							GC	15		15.0-16.3 Clayey Gravel as above [Alluvium]
16.0	16.0	4.0						16		grading into
							CL	17		16.3-17.3 Sandy Clay with trace gravel [Alluvium]
							GC	17		grading into
18.0	18.0	2.0						18		17.3-18.0 Clayey Gravel as above [Alluvium]
								19		1st push Refusal at 18.0 ft. Due to presence of gravel, 2nd push needed. 2nd push refusal at 18.0 ft. (2' away from 1st) 3rd push offset 3.7' west. Refusal at 19.5'
19.5	19.5		19.1 DVR					19		(3rd Push) 17.3-19.5 Clayey Gravel pinkish gray SYR 7/2, yellowish red SYR 17.5' gravel-quartzite (0.1 in) subangular 4/6, 17.5' okay-very stiff, slightly moist [Alluvium]
			19.5					20		

NOTES: General: USCS is modified for this log as follows:

Materials amounts are estimated by % volume instead of % weight.

(1) Badly broken core, accurate footage measurements not possible.

(2) Core breaks cannot be matched, accurate footage measurements not possible.

Procedure No. RMRS/OPS-PRO.101

Revision 0

Date effective: 12/31/98

Page 27 of 28

ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE BOREHOLE LOG

PAGE 1 OF 1

Borehole Number: LP31-062
 Location - North: SURVEY East: SURVEY
 Date: 3/28/05
 Geologist: N. Williams / M. Buciar
 Drilling Equip.: Coyne Western AP-1000

Surface Elevation: SURVEY
 Area: 903
 Total Depth: 25
 Company: URS Project No.:
 Sample Type: SPLIT SPOON

RMRS LOGGING SUPERVISOR

APPROVAL

DATE

TOP/BOTTOM OF CORE IN FEET	TOP/BOTTOM OF INTERVAL	FEET OF CORE IN INTERVAL	MEASUREMENTS	FRAC. ANGLE	SECOND ANGLE	GRAIN SIZE DISTRIBUTION	USCS SYMBOL	DEPTH IN FEET	SPRINT LITHOLOG LOG	SAMPLE DESCRIPTION
	19'						SW	19		0-19' DUAL WALLS - REVERSE CIRCULATION PERCUSSION DRILLED 0-19' SEE PUNCH PROBE LOG FOR DETAILS. INTRODUCED AIR & WATER.
			1.5 2.0					20		
	21'						GC	21		19-21' GRAVELLY SAND, STRONG BROWN, TO GRAY (75% R/L). F-C GRAVEL, WELL GRADED, SUBANGULAR QUARTZITE, COARSE SAND, POORLY GRADED, SUBROUND, RTZ, LOOSE, SATURATED. TRACE CLAY & SILT.
		E	2.0 2.0					22		
		F					CL	23		21-22' GRAVELLY CLAY, YELLOWISH BROWN (10% R 5/4), FINE GRAVEL, POORLY GRADED, SUBANGULAR, QUARTZITE, STIFF, DRY.
	23'							24		22-23' CLAY, DARK BROWN (10% R 3/3), SOME SAND & SILT, LOW PLASTICITY, DRY. (WATER INTRODUCED DURING DRILLING).
		G	2.0 2.0				CL	25		23-24' AS ABOVE. - TIGHT
	25'							26		24-25' CLAYSTONE/CLAY ABOVE BEDROCK SAMPLE, 21-22'.
								27		INTERFACE, 22-23'.
								28		BEDROCK, 24-25'
								29		TD=25'

NOTES: General USCS is modified for this log as follows:

Materials amounts are estimated by % volume instead of % weight.

(1) Badly broken core, accurate footage measurements not possible.

(2) Core breaks cannot be matched, accurate footage measurements not possible.

Procedure No. RMRS/OPS-PRO.101

Revision 0

Date effective: 12/31/98

Page 27 of 28

ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE BOREHOLE LOG

PAGE 1 OF 2Borehole Number: CP39-062Location - North: Surveyed East: SurveyedDate: 3-1-05Geologist: A. PachecoDrilling Equip.: Power ProbeSurface Elevation: SurveyedArea: 903 PadTotal Depth: 17.5'Company: URS

Project No.: _____

Sample Type: dual tubeRMRS LOGGING SUPERVISOR
APPROVAL _____

DATE _____

TOP POSITION OF CORE IN BOX	TOP POSITION OF INTERVAL	FEET OF CORE IN INTERVAL MEASUREMENT	SAMPLE NUMBER	FRACTURE ANGLE	SECOND ANGLE	GRAIN SIZE DISTRIBUTION	USCS SYMBOL	DEPTH IN FEET	RMRS LITHOLOGIC LOG	SAMPLE DESCRIPTION
							GM	0		0-3.4
								1		Sand-silt-clay mixture with gravel dark reddish brown SYR 3/3 poorly-graded gravel-subangular quartzite, granitic (0.1 in.) coarse-medium sand, subrounded soft, slightly moist [Fill]
								2		
								3		
4.0	4.0	4.0	3.4 B voc				CL	4		3.4 - 4.0 Gravelly Clay [Alluvium] lt. gray 10YR 7/2 poorly-graded gravel-subangular quartzite (0.05 in.) soft, moist
			4.5 C voc				GL	5		4.0-4.5 Gravelly Clay [Alluvium] 4.5-12.0 Clayey Gravel gravel (0.1 in) quartzite dark gray 7.5YR subangular clay-stiff, slightly moist [Alluvium]
								6		
								7		
8.0	8.0	4.0	6.0 Composite & screen 0-10'					8		
								9		
								10		

NOTES: General: USCS is modified for this log as follows:

Materials amounts are estimated by % volume instead of % weight.

(1) Badly broken core, accurate footage measurements not possible.

(2) Core breaks cannot be matched, accurate footage measurements not possible.

Procedure No. RMRS/OPS-PRO.101

Revision 0

Date effective: 12/31/98

Page 27 of 28

ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE BOREHOLE LOG

PAGE 2 OF 2

Borehole Number: CP39-062Location - North: Surround East: SurroundDate: 3-1-05Geologist: A PachecoDrilling Equip.: Power ProbeSurface Elevation: SurveyedArea: 903 PadTotal Depth: 19.5'Company: URSSample Type: dual tube

Project No.: _____

RMRS LOGGING SUPERVISOR

APPROVAL _____

DATE _____

TOP OF CORE IN BOX	TOP OF CORE IN BOX	INTERVAL FEET OF CORE IN INTERVAL FIELD MEASUREMENT	SAMPLE NUMBER	FRACTURE ANGLE	SEEDING ANGLE	GRAIN SIZE DISTRIBUTION	USCS SYMBOL	DEPTH IN FEET	SRIL LITHOLOGIC LOG	SAMPLE DESCRIPTION
							GC			Clayey Gravel as above [Alluvium]
12.0	12.0	4.0						11		
								12		
								13		
								14		
							CL	15		grading into 14.5-15.0 Sandy Clay with trace gravel grading into [Alluvium]
16.0	16.0	4.0					GC	15.0		15.0-16.3 Clayey Gravel as above [Alluvium]
								16		
							CL	16.3		grading into 16.3-17.3 Sandy Clay with trace gravel [Alluvium]
								17		
18.0	18.0	2.0					GC	17.3		grading into 17.3-18.0 Clayey Gravel as above [Alluvium]
								18		
								19		1st push Refusal at 18.0 ft. Due to presence of gravel, 2nd push needed. 2nd push refusal at 18.0 ft. (2' away from 1st) 3rd push offset 3.7' west. Refusal at 19.5' (3rd Push) 17.3-19.5 Clayey Gravel pinkish gray SYR 7/2, yellowish red SYR 17.5 gravel-quartzite (0.1 in) subangular 4/6, clay-very stiff, slightly moist [Alluvium]
19.5	19.5		19.1 DVR					19.5		
			19.5					20		

NOTES: General: USCS is modified for this log as follows:

Materials amounts are estimated by % volume instead of % weight.

(1) Badly broken core, accurate footage measurements not possible.

(2) Core breaks cannot be matched, accurate footage measurements not possible.

Procedure No. RMRS/OPS-PRO.101

Revision 0

Date effective: 12/31/98

Page 27 of 28

ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE BOREHOLE LOG

PAGE 1 OF 2

Borehole Number: CP39-063Location - North: Surveyed East: SurveyedDate: 2-28-05Geologist: A. PachecoDrilling Equip.: Power ProbeSurface Elevation: SurveyedArea: 903 PadTotal Depth: 16.0'Company: VRS

Project No.: _____

Sample Type: Dual Tube

RMRS LOGGING SUPERVISOR

APPROVAL _____

DATE _____

TOP/BOTTOM OF CORE IN BOF	TOP/BOTTOM OF INTERVAL	FEET OF CORE IN INTERVAL FIELD MEASUREMENT	SAMPLE NUMBER	FRACURE ANGLE	BEDDING ANGLE	GRAIN SIZE DISTRIBUTION	USCS SYMBOL	DEPTH IN FEET	SOIL/ LITHOLOGIC LOG	SAMPLE DESCRIPTION
							GM	0		0-3.0 Sand-silt-clay mixture with gravel (10%), dark reddish brown SYR 3/4 poorly-graded, subangular gravels quartzite (0.05 in), dry [Fill]
								1		
								2		
								3		3.0-Clayey Gravel [Native Soil]
4.0	4.0	4.0	AC VOC				GC	4		9.5 Reddish brown SYR 5/4 to Pinkish gray SYR 7/2 poorly graded, subangular quartzite dark gray SYR 4/1 dry
								5		
								6		
								7		
8.0	8.0	4.0	BD VOC					8		8.0-12.0 Clayey Gravel as above (2nd Push)
								9		More Gravel
								10		1st Push Refusal at 9.5 ft.

NOTES: General USCS is modified for this log as follows:

Materials amounts are estimated by % volume instead of % weight.

(1) Badly broken core, accurate footage measurements not possible.

(2) Core breaks cannot be matched, accurate footage measurements not possible.

Procedure No. RMRS/OPS-PRO.101

Revision 0

Date effective: 12/31/98

Page 27 of 28

ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE BOREHOLE LOG

PAGE 2 OF 2Borehole Number: CP39-063Surface Elevation: SurveyedLocation - North: Surveyed East: SurveyedArea: 903 PadDate: 2-28-05Total Depth: 16.0'Geologist: A. PachecoCompany: URS

Project No.: _____

Drilling Equip.: Power ProbeSample Type: Dual Tube

RMRS LOGGING SUPERVISOR

APPROVAL _____

DATE _____

TOP OF CORE IN BOX	TOP OF CORE IN BOX	INTERVAL FEET OF CORE IN INTERVAL IN FIELD MEASUREMENT	SAMPLE NUMBER	FRACURE ANGLE	BEDDING ANGLE	GRAIN SIZE DISTRIBUTION	USCS SYMBOL	DEPTH IN FEET	SOIL LITHOLOGIC LOG	SAMPLE DESCRIPTION
12.0	12.0	4.0					GL	11		Clayey Gravel - see above gravel - quartzite, dk gray SYR 4/1 Subangular, crushed
								12		grading into Gravelly Clay Reddish brown 2-SYR 4/4 Stiff, slightly moist less gravel.
								13		
			M VOL					14		Silty Sandstone reddish brown 2-SYR 4/4
			N VOL					15		
16.0	16.0	4.0						16		TD=16.0'
								17		Gamma Screen of composite samples resulted in 0.0 pCi/g Americium.
								18		Excess cuttings permitted to go back in hole.
								19		
								20		

NOTES: General: USCS is modified for this log as follows:

Materials amounts are estimated by % volume instead of % weight.

(1) Badly broken core, accurate footage measurements not possible.

(2) Core breaks cannot be matched, accurate footage measurements not possible.

Procedure No. RMRS/OPS-PRO.101

Revision 0

Date effective: 12/31/98

Page 27 of 28

ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE BOREHOLE LOG

PAGE 1 OF 2Borehole Number: CP39-063Location - North: Surveyed East: SurveyedDate: 2-28-05Geologist: A. PachecoDrilling Equip.: Power ProbeSurface Elevation: SurveyedArea: 903 PadTotal Depth: 16.0'Company: URS

Project No.: _____

Sample Type: Dual Tube

RMRS LOGGING SUPERVISOR

APPROVAL _____

DATE _____

TOP POSITION OF CORE IN BOX	TOP POSITION OF INTERVAL	INTERVAL FEET OF CORE IN INTERVAL FIELD MEASUREMENT	SAMPLE NUMBER	FRACURE ANGLE	SECONG ANGLE	GRAIN SIZE DISTRIBUTION	USCS SYMBOL	DEPTH IN FEET	SOIL LOG	SAMPLE DESCRIPTION
							GM	0		0-3.0 Sand-silt-clay mixture with gravel (10%) dark reddish brown SYR 3/4 poorly-graded, subangular gravels quartzite (0.05 in), dry [Fill]
								1		
								2		
								3		3.0-Clayey Gravel [Native Soil]
4.0	4.0	4.0	AC VOC				GC	4		9.5 Reddish brown SYR 5/4 to Pinkish gray SYR 7/2 poorly graded, subangular quartzite dark gray SYR 4/1 dry
			BD VOC					5		
								6		
								7		
8.0	8.0	4.0	Composite 5 Screen 0-10'					8		8.0-12.0 Clayey Gravel as above (2nd Push)
								9		More Gravel
								10		1st Push Refusal at 9.5 ft.

NOTES: General: USCS is modified for this log as follows:

Materials amounts are estimated by % volume instead of % weight.

(1) Badly broken core, accurate footage measurements not possible.

(2) Core breaks cannot be matched, accurate footage measurements not possible.

Procedure No. RMRS/OPS-PRO.101

Revision 0

Date effective: 12/31/98

Page 27 of 28

ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE BOREHOLE LOG

PAGE 2 OF 2Borehole Number: CP39-063Location - North: Surveyed East: SurveyedDate: 2-28-05Geologist: A. PachecoDrilling Equip.: Power ProbeSurface Elevation: SurveyedArea: 903 PadTotal Depth: 16.0'Company: URS

Project No.: _____

Sample Type: Dual TubeRMRS LOGGING SUPERVISOR
APPROVAL _____

DATE _____

TOP OF CORE IN LOG	TOP OF CORE IN LOG	INTERVAL FEET OF CORE IN LOG	INTERVAL FEET OF CORE IN LOG	MEASUREMENT	SAMPLE NUMBER	FRACURE ANGLE	SEDDING ANGLE	GRAIN SIZE DISTRIBUTION	USCS SYMBOL	DEPTH IN FEET	LOG	SAMPLE DESCRIPTION
									GC			Clayey Gravel - see above gravel - quartzite, dk gray 5YR 4/1 Subangular, crushed
										11		grading into Gravelly Clay
										12		Reddish brown 2.5YR 4/4 Stiff, slightly moist less gravel.
										13		
					M VOC					14		Silty Sandstone reddish brown 2.5YR 4/4
					N VOC					15		
										16		TD=16.0'
										17		Gamma Screen of composite samples resulted in 0.0 pCi/g Americium.
										18		Excess cuttings permitted to go back in hole.
										19		
										20		

NOTES: General: USCS is modified for this log as follows:

Materials amounts are estimated by % volume instead of % weight.

(1) Badly broken core, accurate footage measurements not possible.

(2) Core breaks cannot be matched, accurate footage measurements not possible.

Procedure No. RMRS/OPS-PRO.101

Revision 0

Date effective: 12/31/98

Page 27 of 28

**Groundwater IM/IRA - 903 Pad VOC
Investigation**

Area 2

Borehole Logs

ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE BOREHOLE LOG

PAGE 2 OF 2Borehole Number: CP39-064Surface Elevation: SURVEYLocation - North: 749247.9 East: 285792Area: 700-11 (903 Pad)Date: 3/9/05

Total Depth: _____

Geologist: Z TATACompany: URSProject No.: GR210100Drilling Equip.: AMS POWERPROBE 9620 TITANSample Type: AMS DUAL TUBE

RMRS LOGGING SUPERVISOR

APPROVAL _____

DATE _____

TOP/BOTTOM OF CORE IN BOX	TOP/BOTTOM OF INTERVAL	FEET OF CORE IN INTERVAL MEASUREMENT	SAMPLE NUMBER	FRACTURE ANGLE	BEDDING ANGLE	GRAIN SIZE DISTRIBUTION	USCS SYMBOL	DEPTH IN FEET	SOIL LITHOLOGIC LOG	SAMPLE DESCRIPTION
			C				GP	10		
		10.5	D				SC	11		
		11.5						12		
								13		
								14		
	12.0	14.0	E					15		
		15.2	F				CI	16		
		16.0	TD					17		
								18		
								19		
								20		

10.5 - 15.2
Clayey sand w/ gravel,
yellowish red 5YR 5/6,
medium, subangular,
poorly graded, feldspar
etc, slightly moist.

15.2 - 16.0 Sandy
light gray 5Y 7/1 mottled with
dusky yellow 2.5Y 6/8 stiff,
slightly moist, fine subangular sand
[WEATHERED BEDROCK]

NOTES: General: USCS is modified for this log as follows:

Materials amounts are estimated by % volume instead of % weight.

(1) Badly broken core, accurate footage measurements not possible.

(2) Core breaks cannot be matched, accurate footage measurements not possible.

Procedure No. RMRS/OPS-PRO-101

Revision 0

Date effective: 12/31/98

Page 27 of 28

ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE BOREHOLE LOG

PAGE 1 OF 2

Borehole Number: CP39-065Surface Elevation: SurveyLocation - North: Survey East: Survey N 749 201.6Area: 700-11 (903 pad)Date: 2/8/05 - 3/9/05 E 2085 784Total Depth: 18.0 ft 5gsGeologist: Z TutaCompany: URSProject No.: 6R210100Drilling Equip.: AMS POWERPROBE 9620 TITANSample Type: AMS DUAL TUBE

RMRS LOGGING SUPERVISOR

APPROVAL _____

DATE _____

TOP/BOTTOM OF CORE IN BOX	TOP/BOTTOM OF INTERVAL FEET OF CORE IN INTERVAL FIELD MEASUREMENT	SAMPLE NUMBER	FRACTURE ANGLE	BEDDING ANGLE	GRAIN SIZE DISTRIBUTION	USCS SYMBOL	DEPTH IN FEET	SOIL LITHOLOGIC LOG	SAMPLE DESCRIPTION
	3.0 / 4.0					FILL SW			Begin 1332 3/8/05
		3.2 A					1		0-3.2 Gravelly sand, very dk grayish brown 10YR 2.5/2 Fine-coarse, well-graded, subround, quartz, slightly moist [FILL]
							2		
							3		
						GC	4		3.2-8.0 Sandy gravel with clay, strong brown 7.5 YR 5/8 to white 7.5 YR 8/1, coarse, poorly graded, subround, etcite, dry.
	4.0 3.4 / 6.0	4.0 B					5		
							6		
		6.0					7		
							8		[At 12.0, pulled out rods to retrieve 9-12 sample tube.]
	8.0 4.0 / 4.0					GP	9		9.0-12.0 Sandy gravel, pinkish gray 5YR 7/2 to reddish yellow 5YR 6/6, coarse, poorly graded, subround, etcite, dry, with some clay (<10%).
							10		

NOTES: General USCS is modified for this log as follows:

Materials amounts are estimated by % volume instead of % weight.

(1) Badly broken core, accurate footage measurements not possible.

(2) Core breaks cannot be matched, accurate footage measurements not possible.

Procedure No. RMRS/OPS-PRO:101

Revision 0

Date effective: 12/31/98

Page 27 of 28

34

ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE BOREHOLE LOG

PAGE 2 OF 2

Borehole Number: CP39-065Surface Elevation: SurveyLocation - North: Survey East: SurveyArea: 700-11 (903 Pad)Date: 3/8/05 - 3/9/05Total Depth: 18.0 ftGeologist: Z TUTACompany: URS Project No.: GR210100Drilling Equip.: AMS POWERPROBE 9620 TITANSample Type: AMS DUAL TUBE

RMRS LOGGING SUPERVISOR

APPROVAL _____

DATE _____

TOP/BOTTOM OF CORE IN BOX	TOP/BOTTOM OF INTERVAL	FEET OF CORE IN INTERVAL MEASUREMENT	SAMPLE NUMBER	FRACTURE ANGLE	SEDIMENT ANGLE	GRAIN SIZE DISTRIBUTION	USCS SYMBOL	DEPTH IN FEET	SOIL LITHOLOGIC LOG	SAMPLE DESCRIPTION
							GP	10		
								11		
	12.0	3.6 4.0						12		12.0 - 15.2 16.0 3T sandy gravel, as above
								13		
			14.2					14		[Sample tube driven 16.0 - 18.5 was empty; no sample in outer tube when pulled. Offset 1' N, pushed solid point to refusal at 10.5 ft. Offset 1' S of original location, pushed solid point to 10.5 ft. END OF DAY 3/8/05 JT 3/1/05 JT - Begin pushing sampler from 10.5 ft at 0855]
			C					15		
			15.2							
			D				CL	16		
	16.0	2.0 2.0	16.0				CL	16		15.2 - 16.0 Sandy clay, light gray 5Y 7/1 mottled with olive yellow 2.5Y 6/8, stiff, slightly moist. [WEATHERED BEDROCK]
								17		16.0 - 18.0 TD Clay, gray 5Y 5/1 w/ some mottling olive yellow 2.5Y 6/8 that decreases with depth, slightly moist; stiff very stiff.
	18.0 TD							18		WEATHERED BEDROCK
								19		
								20		18.0 TD

NOTES: General: USCS is modified for this log as follows:

Materials amounts are estimated by % volume instead of % weight.

(1) Badly broken core, accurate footage measurements not possible.

(2) Core breaks cannot be matched, accurate footage measurements not possible.

Procedure No. RMRS/OPS-PRO-101

Revision 0

Date effective: 12/31/98

Page 27 of 28

ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE BOREHOLE LOG

PAGE 1 OF 2

Borehole Number: CP39-066
 Location - North: Surveyed East: Surveyed
 Date: 5/17/85
 Geologist: A. Pacheco Z. Tura
 Drilling Equip.: Power Probe

Surface Elevation: Surveyed
 Area: 903 Pad
 Total Depth: 20.0 TD
 Company: URS Project No.: GR210100
 Sample Type: Dual Tube

RMRS LOGGING SUPERVISOR
APPROVAL

DATE _____

TOP OF CORE IN BOH	INTERVAL OF TOP OF CORE IN BOH	DEPTH IN FEET	USCS SYMBOL	DEPTH IN FEET
	3.0 4.0		F L L SW	1 2
	3.3 A		GC	3
4.0	3.7 4.0		GC	4
				5
	6.0			6
				7
8.0	4.0 4.0			8
				9
				10

SAMPLE DESCRIPTION

BEGIN 0837

0-3.3 Gravelly sand,
 very dk grayish brown 10YR 3/2,
 fine-coarse, well-graded,
 subround, quartz, slightly
 moist. [FILL]

3.3-8.0 Clayey gravel with
 sand, pinkish gray 7.5YR 7/2
 to pink 7.5YR 7/4, coarse,
 poorly graded, subround,
 quartzite, dry.

8.0-12.0 Clayey gravel w/ sand
 as above except yellowish red
 5YR 5/8 to white 5YR 8/1.

NOTES: General: USCS is modified for this log as follows:

Materials amounts are estimated by % volume instead of % weight.

(1) Badly broken core, accurate footage measurements not possible.

(2) Core breaks cannot be matched, accurate footage measurements not possible.

Procedure No. RMRS/OPS-PRO.101

Revision 0

Date effective: 12/31/98

Page 27 of 28

ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE BOREHOLE LOG

PAGE 2 OF 2

Borehole Number: CP39-066
 Location - North: Survey East: Survey
 Date: 3/8/05
 Geologist: Z. TWA
 Drilling Equip.: AMS POWER PROBE

Surface Elevation: Survey
 Area: 900-11 903 PCD
 Total Depth: 20.0 TD
 Company: URS Project No.: GR210100
 Sample Type: AMS DUAL TUBE

RMRS LOGGING SUPERVISOR

APPROVAL _____

DATE _____

TOP/BOTTOM OF CORE IN BOX	TOP/BOTTOM OF INTERVAL	FEET OF CORE IN INTERVAL (FIELD MEASUREMENT)	SAMPLE NUMBER	FRACTURE ANGLE	BEDDING ANGLE	GRAIN SIZE DISTRIBUTION	USCS SYMBOL	DEPTH IN FEET	SOIL/ LITHOLOGIC LOG	SAMPLE DESCRIPTION
							GC	10		
								11		
								12		
	12.0	3.7 4.0						13		12.0-16.1 (3F) Clayey gravel with sand, yellowish red 5YR 5/6, coarse, poorly graded, subangular, platy, dry.
								14		
								15		
			15.6				GC	16		
			C				CL	17		16.1-19.0 Clay, dk gray 5Y 4/1 mottled with olive 5Y 5/6, very stiff, slightly moist.
	16.0	2.9 4.0	16.1 16.6					18		[WEATHERED BEDROCK]
								19		
								20		19.0-20.0 TD NO RECOVERY

NOTES: General: USCS is modified for this log as follows:

Materials amounts are estimated by % volume instead of % weight.

- (1) Badly broken core, accurate footage measurements not possible.
 (2) Core breaks cannot be matched, accurate footage measurements not possible.

Procedure No. RMRS/OPS-PRO.101

Revision 0

Date effective: 12/31/98

Page 27 of 28

**Groundwater IM/IRA - 903 Pad VOC
Investigation**

Area 3

Borehole Logs

ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE BOREHOLE LOG

PAGE 1 OF 3Borehole Number: CP38-091Location - North: Surveyed East: SurveyedDate: 3/31/85 3/4/85Geologist: A. PachecoDrilling Equip.: PowerProbeSurface Elevation: SurveyedArea: 905 PadTotal Depth: 24.0'Company: URS

Project No.: _____

Sample Type: Dual TubeRMRS LOGGING SUPERVISOR
APPROVAL

DATE _____

TOP POSITION OF CORE IN BOX	TOP POSITION OF INTERVAL	TEST OF CORE IN INTERVAL FIELD MEASUREMENT	SAMPLE NUMBER	FRACURE ANGLE	SECOND ANGLE	GRAIN SIZE DISTRIBUTION	USCS SYMBOL	DEPTH IN FEET	SRV LITHOLOGIC LOG	SAMPLE DESCRIPTION
							GM	1		0-4.0 Sand-silt-clay mixture with gravel Reddish brown SYR 4/3 sand- coarse to med. subrounded qtz clay- soft, slightly moist gravel- subangular qtzite (0.05 in) [Fill]
4.0	4.0	4.0						2		
			A					3		
			vol					4		4.0-8.8 Gravelly Sandy clay Gravel- subang. qtzite (0.1 in) poorly- compacted soft clay graded
								5		Sand-med.-coarse gr. subrounded reddish brown SYR 5/3
			6.0					6		
			7.0					7		7-7.5 PID = 1 ppm soft clay grading into stiff
			B					8		
8.0	8.0	4.0	7.5					9		8.8-9.2 Sandy clay with gravel - 5% less grading into 9.2 Gravelly Sandy clay gravel
								10		

NOTES: General USCS is modified for this log as follows:

Materials amounts are estimated by % volume instead of % weight.

(1) Badly broken core, accurate footage measurements not possible.

(2) Core breaks cannot be matched, accurate footage measurements not possible.

Procedure No. RMRS/OPS-PRO.101

Revision 0

Date effective: 12/31/98

Page 27 of 28

ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE BOREHOLE LOG

PAGE 2 OF 3

Borehole Number: CP38-091

Location - North: Surveyed East: Surveyed

Date: 3/4/05

Geologist: A Padheco

Drilling Equip.: Powers Probe

Surface Elevation: Surveyed

Area: 903 Pad

Total Depth: 24.0

Company: VES

Sample Type: Dual Tube

Project No.: _____

RMRS LOGGING SUPERVISOR APPROVAL _____

DATE _____

SAMPLE DESCRIPTION

TOP OF CORE IN BOX	TOP OF CORE IN INTERVAL	FEET OF CORE IN INTERVAL	MEASUREMENT	SAMPLE NUMBER	FRASURE ANGLE	SECTION ANGLE	GRAIN SIZE DISTRIBUTION	USCS SYMBOL	DEPTH IN FEET	SOIL LITHOLOGIC LOG
12.0	12.0	4.0						CL	11	see above
									12	
									13	
									14	
									15	
16.0	16.0	4.0							16	
									17	
			C VOL	From 1st push					18	
									19	
20.0	20.0								20	

Refusal at 17.5 ft. ^{At 17.5 ft.} Drive solid
point through quartz layer to crush
for pilot hole from 17.5-21.0 ft.
16.0-20.0 Slough

NOTES: General: USCS is modified for this log as follows:

Materials amounts are estimated by % volume instead of % weight.

(1) Badly broken core, accurate footage measurements not possible.

(2) Core breaks cannot be matched, accurate footage measurements not possible.

Procedure No. RMRS/OPS-PRO.101

Revision 0

Date effective: 12/31/98

Page 27 of 28

ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE BOREHOLE LOG

PAGE 3 OF 3

Borehole Number: CP38-091Location: North: Surveyed East: SurveyedDate: 3/4/05Geologist: A. PachecoDrilling Equip.: Power ProbeSurface Elevation: SurveyedArea: 903 PadTotal Depth: 21.5 ftCompany: VRSSample Type: Dual Tube

Project No.: _____

RMRS LOGGING SUPERVISOR
APPROVAL _____

DATE _____

TOP OF CORE IN BORE	TOP OF CORE INTERVAL	FEET OF CORE INTERVAL (FIELD MEASUREMENT)	SAMPLE NUMBER	FRACURE ANGLE	SECOND ANGLE	GRAN SIZE DETERMINATION	USCS SYMBOL	DEPTH IN FEET	DEPTH INTERVAL LOG	SAMPLE DESCRIPTION
21.0	21.0	—						21		20.0-24.0 Slough Solid Point drive to 24.0 to crush qtzite. Dual Tube refusal at 21.5 ft.
								22		
								23		
								24		
24.0	24.0	—						25		
								26		
								27		
								28		
								29		
								30		

NOTES: General: USCS is modified for this log as follows:

Materials amounts are estimated by % volume instead of % weight.

(1) Badly broken core, accurate footage measurements not possible.

(2) Core breaks cannot be matched, accurate footage measurements not possible.

Procedure No. RMRS/OPS-PRO.101

Revision 0

Date effective: 12/31/98

Page 27 of 28

ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE BOREHOLE LOG

PAGE 1 OF 1

Borehole Number: CP38-091
 Location - North: _____ East: _____
 Date: 3/30/05 & 3/31/05 (30)
 Geologist: Z. Tuta
 Drilling Equip.: Loyal - Drilling System AP-1000

Surface Elevation: _____
 Area: 900-11 (90.3 Rd)
 Total Depth: _____
 Company: URS Project No.: GR210100
 Sample Type: Split Spoon

RMRS LOGGING SUPERVISOR

APPROVAL _____

DATE _____

TOP BOTTOM OF CORE IN BOX	TOP BOTTOM OF INTERVAL	FEET OF CORE IN INTERVAL MEASUREMENT	SAMPLE NUMBER	FRACTURE ANGLE	BEDDING ANGLE	GRAIN SIZE DISTRIBUTION	USCS SYMBOL	DEPTH IN FEET	SOIL LITHOLOGIC LOG	SAMPLE DESCRIPTION
								23		Begin 3/30/05 1441
	24.0									Advanced borehole without sampling via dual-wall reverse circulation percussion drilling with air (water added for dust suppression) from 0 to
	24.4	0.4 0.4	D				GC	24		24.0-24.4 clayey gravel w/ sandy coarse, subangular, poorly graded, etcite, moist.
	25.0							25		25.0-25.3 NO RECOVERY
	25.3	0.3 0.3								
	26.0	0/0						26		26.0 [No split spoon penetration]
	27.0							27		27.0-27.5 NO RECOVERY
										27.5 STOP FOR END OF DAY 3/30/05
										3/31/05 NatD Well
										24' by 0.1' recovery GC at base
										25-27' clay brown to grey, grey
										F gnd, poorly graded; stiff
										tight clay; dry to damp;
										No PID reading; No red readings
										Split Spoon sample

NOTES: General: USCS is modified for this log as follows:

Materials amounts are estimated by % volume instead of % weight.

(1) Badly broken core, accurate footage measurements not possible.

(2) Core breaks cannot be matched, accurate footage measurements not possible.

Procedure No. RMRS/OPS-PRO.101

Revision 0

Date effective: 12/31/98

Page 27 of 28

ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE BOREHOLE LOG

PAGE 1 OF 1

Borehole Number: CP38-091Surface Elevation: SurveyLocation - North: Survey East: SurveyArea: 900-11Date: 2/30/95Total Depth: 27'Geologist: N. W. WilliamsCompany: URS

Project No.: _____

Drilling Equip.: AP-1000Sample Type: Split Spoon

RMRS LOGGING SUPERVISOR

APPROVAL _____

DATE _____

TOP/BOTTOM OF CORE IN BOX	TOP/BOTTOM OF INTERVAL	FEET OF CORE IN INTERVAL FIELD MEASUREMENT	SAMPLE NUMBER	FRACTURE ANGLE	BEDDING ANGLE	GRANULE DISTRIBUTION	USCS SYMBOL	DEPTH IN FEET	SOIL/ LITHOLOGIC LOG	SAMPLE DESCRIPTION
										0-24' see Z Totz log
								24		24-24.5' 0.1' recovery (GC) not bedrock; no sample
								25		25-27' clay, brown grey (54 7/2) Fgnd, poor grading stiff tight clay typical of other bedrock samples; dry O-PID reading No reds Split Spoon Sample
								26		
								27		27' TD
										Sample collected 25-26' bgs CP38-091E see status log and logbook CHAR656

NOTES: General: USCS is modified for this log as follows:

Materials amounts are estimated by % volume instead of % weight.

(1) Badly broken core, accurate footage measurements not possible.

(2) Core breaks cannot be matched, accurate footage measurements not possible.

Procedure No. RMRS/OPS-PRO-101

Revision 0

Date effective: 12/31/98

Page 27 of 28

ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE BOREHOLE LOG

PAGE 1 OF 3Borehole Number: CP38-092Surface Elevation: SurveyedLocation - North: Surveyed East: SurveyedArea: 903 PadDate: 3/3/05

Total Depth: _____

Geologist: A PachecoCompany: URS

Project No.: _____

Drilling Equip.: Power ProbeSample Type: dual tube

RMRS LOGGING SUPERVISOR

APPROVAL _____

DATE _____

TOP/BOTTOM OF CORE IN BOX	TOP/BOTTOM OF INTERVAL	FEET OF CORE IN INTERVAL FIELD MEASUREMENT	SAMPLE NUMBER	FRACTURE ANGLE	BEDDING ANGLE	GRAIN SIZE DISTRIBUTION	USCS SYMBOL	DEPTH IN FEET	SOIL LITHOLOGIC LOG	SAMPLE DESCRIPTION
							GM			0-3.5 Sand-silt-clay mixture with gravel reddish brown SYR 4/3 poorly graded sand-med.-coarse subrounded quartz clay-soft, slightly moist gravel-0.05-0.1in subangular quartzite [Fill]
			3.5					1		
								2		
								3		0-3.5 Compacted 3.0-4.0 No Recovery (compaction of 0-3.5'. Still 4' recovery.)
4.0	4.0	4.0	A vol					4		3.5' Sandy clay with gravel pink SYR 7/4 sand-med. to fine subrounded gravel clay-soft, moist gravel-0.05in subangular quartzite poorly graded
			5.5				CL	5		
			B vol					6		
			6.0					7		
8.0	8.0	4.0						8		
								9		
								10		

NOTES: General: USCS is modified for this log as follows:

Materials amounts are estimated by % volume instead of % weight.

(1) Badly broken core, accurate footage measurements not possible.

(2) Core breaks cannot be matched, accurate footage measurements not possible.

Procedure No. RMRS/OPS-PRO.101

Revision 0

Date effective: 12/31/98

Page 27 of 28

ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE BOREHOLE LOG

PAGE 2 OF 3

Borehole Number: CP38-092Surface Elevation: SurveyedLocation - North: Surveyed East: SurveyedArea: 903 PadDate: 3/3/05Total Depth: 21'Geologist: A PachecoCompany: URS

Project No.: _____

Drilling Equip.: Power ProbeSample Type: dual tube

RMRS LOGGING SUPERVISOR

APPROVAL _____

DATE _____

TOP/BOTTOM OF CORE IN BOX	TOP/BOTTOM OF INTERVAL	FEET OF CORE IN INTERVAL (FIELD MEASUREMENT)	SAMPLE NUMBER	FRACTURE ANGLE	BEDDING ANGLE	GRAIN SIZE DISTRIBUTION	USCS SYMBOL	DEPTH IN FEET	SOIL LITHOLOGIC LOG	SAMPLE DESCRIPTION
							CL			Sandy clay with gravel as above Snd - increase to coarse subrounded " to medium "
12.0	12.0	4.0						11		
								12		grading into
								13		Sandy Gravelly Clay
								14		gravel - 0.1 in subangular quartzite dark gray SYR 4/1
								15		
16.0	16.0	4.0						16		16.0-18.6 Sandy Gravelly clay as above
								17		
								18		
								19		18.6 Gravelly Clay 5% less sand; gravel 0.1-0.15 in subangular quartzite
								20		19.1-19.3 Sandy Clay greenish gray Gley 15/1 10% less gravel
20.0	20.0									19.3-20.0 Sandy Gravelly Clay as above 16.0-18.6

NOTES: General: USCS is modified for this log as follows:

Materials amounts are estimated by % volume instead of % weight.

(1) Badly broken core, accurate footage measurements not possible.

(2) Core breaks cannot be matched, accurate footage measurements not possible.

Procedure No. RMRS/OPS-PRO.101

Revision 0

Date effective: 12/31/98

Page 27 of 28

ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE BOREHOLE LOG

PAGE 3 OF 3Borehole Number: CP38-092Surface Elevation: SurveyedLocation - North: Surveyed East: SurveyedArea: 903 PadDate: 3-3-05Total Depth: 21'Geologist: A PachecoCompany: URS

Project No.: _____

Drilling Equip.: Power ProbeSample Type: dual tube

RMRS LOGGING SUPERVISOR

APPROVAL _____

DATE _____

TOP/BOTTOM OF CORE IN BOX	TOP/BOTTOM OF INTERVAL	FEET OF CORE INTERVAL MEASUREMENT	SAMPLE NUMBER	FRACTURE ANGLE	BEDDING ANGLE	GRAIN SIZE DISTRIBUTION	USCS SYMBOL	DEPTH IN FEET	SOIL/ LITHOLOGIC LOG	SAMPLE DESCRIPTION
			20.5				Cl			Sandy Gravelly Clay as above
21.0	21.0	1.0	C voc					21		Refusal at 21.0 on 3/4/05 pushed 2nd offset 5' to NW. Refusal at 18.5 ft.
			21.0					22		
								23		
								24		
								25		
								26		
								27		
								28		
								29		
								30		

NOTES: General: USCS is modified for this log as follows:

Materials amounts are estimated by % volume instead of % weight.

(1) Badly broken core, accurate footage measurements not possible.

(2) Core breaks cannot be matched, accurate footage measurements not possible.

Procedure No. RMRS/OPS-PRO.101

Revision 0

Date effective: 12/31/98

Page 27 of 28

ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE BOREHOLE LOG

PAGE 1 OF 1

Borehole Number: CP38-092

Surface Elevation: _____

Location - North: _____ East: _____

Area: _____

Date: 3/30/05

Total Depth: _____

Geologist: Z TURACompany: URSProject No.: GR210100Drilling Equip.: Layne - Drilling System AP-1000Sample Type: Split-Spoon

RMRS LOGGING SUPERVISOR

APPROVAL _____

DATE _____

TOP/BOTTOM OF CORE IN BOX	TOP/BOTTOM OF INTERVAL	FEET OF CORE IN INTERVAL (FIELD MEASUREMENT)	SAMPLE NUMBER	FRACTURE ANGLE	BEDDING ANGLE	GRAIN SIZE DISTRIBUTION	USCS SYMBOL	DEPTH IN FEET	SOIL LITHOLOGIC LOG	SAMPLE DESCRIPTION
								24		Begin 3/30/05 1030/offset 1245
	25.0							25		Advanced borehole without sampling via dual-well, radorse-circulation percussion drilling from 0 to 25 ft (gravel per entries) then sample as indicated below.
		8.6 2.0						26		25-26.4 NO RECOVERY 26.0-26.6 Clayey gravel, 26.4-27.0 light gray ss 7/2 coarse, poorly sorted, subrounded, wet, glauite.
			26.4							
	27.0		D 27.0				GC	27		27.0 - 28.0 clay, gray (ss/5/1), ++ very stiff, moist.
		1.0 1.5	E 27.5				CL			WEATHERED BEDROCK
	28.5							28		28.0-28.5 NO RECOVERY
	TD							29		
								30		

NOTES: General: USCS is modified for this log as follows:

Materials amounts are estimated by % volume instead of % weight.

(1) Badly broken core, accurate footage measurements not possible.

(2) Core breaks cannot be matched, accurate footage measurements not possible.

Procedure No. RMRS/OPS-PRO.101

Revision 0

Date effective: 12/31/98

Page 27 of 28

ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE BOREHOLE LOG

PAGE 1 OF 2

Borehole Number: CP38-093
 Location - North: Survey East: Survey
 Date: 3/2/05
 Geologist: M Brown
 Drilling Equip.: 6610DT Geoplog

Surface Elevation: Survey
 Area: 900-11
 Total Depth: _____
 Company: URS Project No.: _____
 Sample Type: Macro Core

RMRS LOGGING SUPERVISOR

APPROVAL _____

DATE _____

TOP/BOTTOM OF CORE IN BOX	TOP/BOTTOM OF INTERVAL	FEET OF CORE IN INTERVAL MEASUREMENT	SAMPLE NUMBER	FRACTURE ANGLE	BEDDING ANGLE	GRAIN SIZE DISTRIBUTION	USCS SYMBOL	DEPTH IN FEET	SOIL LITHOLOGIC LOG	SAMPLE DESCRIPTION
								1		
								2		
								3		
								4		
	2/2	4.0					GM	5		10yr 7/4 Subangular silt/gravel gravel > 3cm Very Pale brown 0.0ppm course poorly sorted
	1/1	5.0					GM	6		10yr 7/4 silt/gravel 0.0ppm Same as above
	1/1	6.0					SM	7		10yr 8/2 Poor sorted - med Very Pale Brown Subangular silt/sand gravel 1-2cm 0.0ppm
	2/2	7.0					GM	8		10yr 8/1-8/4 Poor sorted - med White to Very Pale Brown Silt/sand gravel 2cm-5cm 0.0ppm Subangular
	1/1	9.0					GM	9		
	1/1	10					GM	10		same as above 0.0ppm

NOTES: General: USCS is modified for this log as follows:

Materials amounts are estimated by % volume instead of % weight.

(1) Badly broken core, accurate footage measurements not possible.

(2) Core breaks cannot be matched, accurate footage measurements not possible.

Procedure No. RMRS/OPS-PRO.101

Revision 0

Date effective: 12/31/98

Page 27 of 28

41

ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE BOREHOLE LOG

PAGE 2 OF 2

Borehole Number: CP38-093
 Location - North: Survey East: Survey
 Date: 3/2/05
 Geologist: M. Brown
 Drilling Equip.: 6610 DT Geo probe

Surface Elevation: Survey
 Area: 900-11
 Total Depth: _____
 Company: URS Project No.: _____
 Sample Type: Macro core

RMRS LOGGING SUPERVISOR
 APPROVAL _____

DATE _____

TOP/BOTTOM OF CORE IN BOX	TOP/BOTTOM OF INTERVAL	FEET OF CORE IN INTERVAL (FIELD MEASUREMENT)	SAMPLE NUMBER	FRACTURE ANGLE	BEDDING ANGLE	GRAIN SIZE DISTRIBUTION	USCS SYMBOL	DEPTH IN FEET	SOIL LITHOLOGIC LOG	SAMPLE DESCRIPTION
							SM	10		10yr 4/4 dark yellow brown silt sand poor sorted med
	2 1/2						GM	11		10yr 6/4 light yellow brown 0.0ppm Subangular silty/gravel gravel > 3cm Poor sorted med
		12						12		
	2 1/2						GM	13		Silty/gravel gravel > 3m Poor sorted med 0.0ppm
		14						14		10yr 6/4 light yellow brown Subangular
	2 1/2						GM	15		Same as above 0.0ppm
		16						16		
	2 1/2						GM	17		Same as above 0.0ppm
		18						18		
	1 1/4						GM	19		Same as above 0.0ppm
		19						19		
								20		19 TD refusal (See A. Pacheco log for later attempt to greater depth) 3/3-05

NOTES: General: USCS is modified for this log as follows:

Materials amounts are estimated by % volume instead of % weight.

(1) Badly broken core, accurate footage measurements not possible.

(2) Core breaks cannot be matched, accurate footage measurements not possible.

Procedure No. RMRS/OPS-PRO.101

Revision 0

Date effective: 12/31/98

Page 27 of 28

ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE BOREHOLE LOG

PAGE 2 OF 3Borehole Number: CP38-093Location - North: Surveyed East: SurveyedDate: 3-3-05Geologist: A. PachecoDrilling Equip.: PowerProbeSurface Elevation: SurveyedArea: 903 PadTotal Depth: 30'Company: URS

Project No.: _____

Sample Type: Dual Tube

RMRS LOGGING SUPERVISOR

APPROVAL _____

DATE _____

TOP POSITION OF CORE IN BOX	TOP POSITION OF INTERVAL	FEET OF CORE IN INTERVAL MEASUREMENT	SAMPLE NUMBER	FRACTURE ANGLE	SECONDS ANGLE	GRAIN SIZE DISTRIBUTION	USCS SYMBOL	DEPTH IN FEET	SRM/ LITHOLOGIC LOG	SAMPLE DESCRIPTION
								11		10-19' - See alternate boring log from 3-2-05, Geologist: Mark Brown, *note this log begins with Page 2
								12		
								13		
								14		
								15		
								16		
								17		
								18		
19.0	19.0	BEGIN						19	CL	→ in 1st foot from above 19.0-19.7 Gravelly Sandy Clay (compacted Sandy Gravelly Clay (19.0-21.0) Slough) See description next page 19.7 and on - see next page CP 38-093
							CL	20		

NOTES: General: USCS is modified for this log as follows:

Materials amounts are estimated by % volume instead of % weight.

(1) Badly broken core, accurate footage measurements not possible.

(2) Core breaks cannot be matched, accurate footage measurements not possible.

Procedure No. RMRS/OPS-PRO.101

Revision 0

Date effective: 12/31/98

Page 27 of 28

ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE BOREHOLE LOG

PAGE 3 OF 3

Borehole Number: CP35-093Location - North: Surveyed East: SurveyedDate: 3-3-05Geologist: A. PachecoDrilling Equip.: 6610DT (1st push), Power Probe (2nd push)Surface Elevation: SurveyedArea: 903 PadTotal Depth: 30.0'Company: URSSample Type: DWD Tube

Project No.: _____

RMRS LOGGING SUPERVISOR
APPROVAL _____

DATE _____

TOP/BOTTOM OF CORE IN SOIL	TOP/BOTTOM OF INTERVAL	FEET OF CORE IN INTERVAL (FIELD MEASUREMENT)	SAMPLE NUMBER	FRACTURE ANGLE	SECOND ANGLE	GRAIN SIZE DISTRIBUTION	USCS SYMBOL	DEPTH IN FEET	SOIL/ LITHOLOGIC LOG	SAMPLE DESCRIPTION
21.0	21.0	2.0					CL	21		19.7-21.0 Gravelly clay with sand Accs-305
								21		19.3-305 Gravelly clay
								22		21.0-22.0 Sandy clay with gravel
								22		23.0
								23		1st foot compacted slough from above
								23		Hole collapsing above
								24		Reddish brown SYR 4/4 to reddish gray
								24		to reddish yellow SYR 6/6 SYR 5/2
								25		Sand - coarse to med. subrounded. Poorly graded
								25		gravel - subangular, quartzite (0.05 - 0.1 in.)
								25		23.0-25.0 Sandy Gravelly clay as above
								25		Saturated with water at 23.0'
								26		Due to presence of water, hole has
								26		collapsed. Will push 2nd hole with
								27		another rig (Power Probe) beginning at
								27		23 ft with 3/4 ft intervals
								28		2nd Push
								28		25.0- Accs-305
								29		24.0- Accs-305
								29		25.0-25.5 No Recovery
								30		25.5-27.0 Sandy Gravelly clay
								30		27.0-27.5 Sandy clay with gravel
								30		27.5-28.7 Silty Sandstone
								30		mod. strong, completely weathered
								30		dark gray Gley 4/1
								30		28.7-30.0 No Recovery
								30		Tb=30.0

NOTES: General: USCS is modified for this log as follows:

Materials amounts are estimated by % volume instead of % weight.

(1) Badly broken core, accurate footage measurements not possible.

(2) Core breaks cannot be matched, accurate footage measurements not possible.

Procedure No. RMRS/OPS-PRO.101

Revision 0

Date effective: 12/31/98

Page 27 of 28

**Groundwater IM/IRA - 903 Pad VOC
Investigation**

Area 4

Borehole Logs

PAGE 1 OF 2

Project No.:

Sample Type: Dye Tube

DATE _____

Page 27 of 28

PAGE 2 OF 2

Project No.:

DATE _____

NOTES: General USCS is modified for this log as follows:
Materials amounts are estimated by % volume instead of % weight.
(1) Badly broken core, accurate footage measurements not possible.
(2) Core breaks cannot be matched, accurate footage measurements not possible.

Page 27 of 28

PAGE 1 OF 2

Surface Elevation: Surveyed PAGE 1 OF 2
Area: 903 Pnd
Total Depth: 26.0 Ft
Company: URS
Sample Type: Dred Tube Project No.: 6022/0100

DATE _____

NOTES: General USCS is modified for this log as follows:
Materials amounts are estimated by % volume instead of % weight.
(1) Badly broken core, accurate footage measurements not possible.
(2) Core breaks cannot be matched, accurate footage measurements not possible.

Page 27 of 28

PAGE 2 OF 2

Surface Elevation: Surveied
Area: 903 Pnd
Total Depth: 20 Ft
Company: URS
Sample Type: Dual Tube Project No.: GR240100

DATE _____

DATE _____													
STATION NO.	DEPTH FEET	CORRECTION TO TOP OF CORE	INTERVAL FEET OF CORE	INTERVAL IN FEET	MEASUREMENT	SAMPLE NUMBER	FRACTURE ANGLE	SECOND ANGLE	GRAIN SIZE DISTRIBUTION	USCS SYMBOL	DEPTH IN FEET	BRI/ LITHOLOG LOG	SAMPLE DESCRIPTION
0	12.0		12.0	12.0		C					10		12.0-14.0 Sandy gravel with clay, reddish yellow 5YR 5/6, coarse, well-graded, subround, quartzite, dry. [14.0 REFUSAL - OFFSET 3' W for 2nd attempt] SOLID PT TO 14.0, THEN SAMPLE
	14.0		14.0	14.0						11			
0	16.2 2.0		14.0	14.0							12		14.0-16.0 Sandy gravel yellowish red 5YR 5/6, coarse, well-graded, subround, quartzite, dry.
	16.0		16.0	16.0						13			
0	3.5 4.0		16.0	16.0							14		16.0-16.5 NO RECOVERY 16.5-17.5 Sandy gravel with clay, as 14.0-16.0.
	17.0		17.0	17.0						15			
0	12.5 18.0		17.0	17.0							16		17.5-20.0 Clay, brownish yellow 10YR 6/6 to olive grey 5Y 5/2, very st. ff, slightly moist. [WEATHERED BEDROCK].
	18.0		18.0	18.0						17			
20.0	20.0		20.0	20.0							18		20.0 T.D. [PID screens = 0.075mm 0-20.0 ft.]

NOTES: General: USCS is modified for this log as follows:
Materials amounts are estimated by % volume instead of % weight.
(1) Badly broken core, accurate footage measurements not possible.
(2) Core breaks cannot be matched, accurate footage measurements not possible.

Procedure No. RMRS/OPS-PRO.101

Revision 0

Date effective: 12/31/98

Page 27 of 28

U.S. DEPARTMENT OF ENERGY ROCKY FLATS PLANT

FORM PRO.101A

ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE BOREHOLE LOG

PAGE 1 OF 2

Borehole Number: C038-084
 Location - North: Surveyed East: Surveyed
 Date: 3/7/05
 Geologist: A. Pacheco Z. TUSA
 Drilling Equip.: Power Probe

Surface Elevation: Surveyed
 Area: 903 Pad
 Total Depth: _____
 Company: URS Project No.: GR20100
 Sample Type: Dual Tube

RMRS LOGGING SUPERVISOR
 APPROVAL _____

DATE _____

TOP OF CORE IN SOIL	TOP OF CORE IN INTERVAL	FEET OF CORE IN INTERVAL	MEASUREMENT	SAMPLE NUMBER	FRACTURE ANGLE	SEEDING ANGLE	GRAIN SIZE DETERMINATION	USCS SYMBOL	DEPTH IN FEET	LOG LITHOLOGIC	SAMPLE DESCRIPTION
0	2.9	4.0						FI	1		Begin 1242
								SW	2		0-2.5 Gravelly sand, very dark grayish brown 10YR 4/2, fine-coarse, well-sorted, subround, etc., slightly moist. [FILL]
				2.5				CL	3		2.5-3.5 Gravelly clay, yellowish red 5YR 4/6, stiff, slightly moist, w/ fine gravel, subround, etc.
	4.0	4.0	4.0	A				GC	4		3.5-8.0 Sandy gravel with clay, yellowish red 5YR 5/6 to pinkish gray 7.5YR 7/2, coarse, well-sorted, subround, etc., dry.
		3.6	4.0	B					5		
									6		
									7		
									8		8.0-12.0 Sandy gravel w/ clay, as above.
	8.0	4.0	4.0						9		
									10		

NOTES: General: USCS is modified for this log as follows:
 Materials amounts are estimated by % volume instead of % weight.
 (1) Badly broken core, accurate footage measurements not possible.
 (2) Core breaks cannot be matched, accurate footage measurements not possible.

Procedure No. RMRS/OPS-PRO.101

Revision 0

Date effective: 12/31/98

Page 27 of 28

ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE BOREHOLE LOG

PAGE 2 OF 2

Borehole Number: C038-084Location - North: Surveyed East: SurveyedDate: 3/7/05Geologist: A. Pacheco 2 TATADrilling Equip.: Power ProbeSurface Elevation: SurveyedArea: 903 Pad

Total Depth: _____

Company: URSSample Type: Dual TubeProject No.: GR210100RMRS LOGGING SUPERVISOR
APPROVAL _____

DATE _____

SAMPLE DESCRIPTION

TOP/BOTTOM OF CORE IN SOIL	TOP/BOTTOM OF INTERVAL	FEET OF CORE RECOVERED MEASUREMENT	SAMPLE NUMBER	FRACURE ANGLE	SECOND ANGLE	GRAIN SIZE DISTRIBUTION	USCS SYMBOL	DEPTH IN FEET	DEPTH LOG
							GC	10	
								11	
	12.0	1					GC	12	
		2.7						13	
		4.0						14	
								15	
								16	
	16.0							17	
		2.6						18	
		4.0						19	
			17.0					20	
			C						
			17.5						
			D						
			18.0						

12.0 - 16.5: Clayey & sandy
gravel, pale olive 5Y 6/3 to
strong brown 7.5YR 5/8,
coarse, well-sorted, subround,
quartzite/diorite, dry grading
to moist at 16.5 - 17.5 ft.

17.5 - 18.6 Clay,
light olive gray 5Y 6/2 and
brownish yellow 10YR 6/8,
very st. ft, slightly moist.
[WEATHERED BEDROCK]

18.6 - 20.0 NO RECOVERY

20.0 T.D.

NOTES: General: USCS is modified for this log as follows:

Materials amounts are estimated by % volume instead of % weight.

(1) Badly broken core, accurate footage measurements not possible.

(2) Core breaks cannot be matched, accurate footage measurements not possible.

Procedure No. RMRS/OPS-PRO.101

Revision 0

Date effective: 12/31/98

Page 27 of 28

U.S. DEPARTMENT OF ENERGY ROCKY FLATS PLANT

FORM PRO.101A

ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE BOREHOLE LOG

PAGE 1 OF 2

Borehole Number: C038-085
 Location - North: Surveyed East: Surveyed
 Date: 3/7/05
 Geologist: A. Pacheco
 Drilling Equip.: Power Probe

Surface Elevation: Surveyed
 Area: 903 Pad
 Total Depth: _____
 Company: URS
 Sample Type: Dual Tube Project No.: GR2101005

RMRS LOGGING SUPERVISOR
 APPROVAL _____

DATE _____

TOP OF CORE IN BOX	TOP OF CORE IN BOX	INTERVAL FEET OF CORE IN BOX	MEASUREMENTS	SAMPLE NUMBER	FRACTURE ANGLE	SECOND ANGLE	DIAMETER DISTRIBUTION	USCS SYMBOL	DEPTH IN FEET	LOG	SAMPLE DESCRIPTION
		2.3 / 4.0						FILL	1		0-3.0 Gravelly sand, very dk grayish brown 10YR 3/2, fine-coarse, well-graded, subround, etc, slightly moist. [FILL]
		3.0 A						GC	3		3.0-7.5 Clayey gravel w/ sand, strong brown 7.5 YR 5/8, coarse, ^{poorly} graded, subround etcite, dry. Grades to white 7.5 YR 8/1 from 6.5 to 7.5 ft
4.0		3.8 / 4.0	4.0	B					4		
		6.0							5		
									6		
									7		
8.0		4.0 / 4.0						GC	8		7.5-12.0 Clayey gravel with sand, strong brown 2.5 YR 5/6 mottled with light dye gray 5Y 6/2, poorly graded, subround, etcite, dry.
									9		
									10		

NOTES: General: USCS is modified for this log as follows:
 Materials amounts are estimated by % volume instead of % weight.
 (1) Badly broken core, accurate footage measurements not possible.
 (2) Core breaks cannot be matched, accurate footage measurements not possible.

Procedure No. RMRS/OPS-PRO.101

Revision 0

Date effective: 12/31/98

Page 27 of 28

ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE BOREHOLE LOG

PAGE 2 OF 2Borehole Number: LOST C038-095Location - North: Surveyed East: SurveyedDate: 3/7/05Geologist: A. Pacheco S.D. 302-2 TUSADrilling Equip.: Power ProbeSurface Elevation: SurveyedArea: 903 PMTotal Depth: 18.0 TDCompany: URSSample Type: Dual Tube

Project No.: _____

RMRS LOGGING SUPERVISOR
APPROVAL _____

DATE _____

TOP POSITION OF CORE IN BOX	TOP POSITION OF INTERVAL	FEET OF CORE IN INTERVAL	MEASUREMENT	SAMPLE NUMBER	FRACTURE ANGLE	SECOND ANGLE	GRAIN SIZE DISTRIBUTION	USCS SYMBOL	DEPTH IN FEET	LOG	SAMPLE DESCRIPTION
								GC	10		
								GC	11		
	12.0	12.0						GC	12		
		2.5							13		12.0 - 14.5 Sandy gravel w/ clay, yellowish red 5YR 5/8, coarse, poorly graded subround, quartzite, dry.
		2.5							14		
	14.5	14.5							15		14.5 - 15.5 Sandy gravel w/ clay, as above.
		2.6							16		
		3.5						CL	17		15.5 - 17.1 Clay, olive yellow 2.5Y 6/8 mottled with gray 2.5Y 6/1, very stiff, slightly moist. [WEATHERED BEDROCK]
									18		17.1 - 18.0 NO RECOVERY
	18.0	18.0							19		18.0 T.D.
									20		

NOTES: General: USCS is modified for this log as follows:

Materials amounts are estimated by % volume instead of % weight.

(1) Badly broken core, accurate footage measurements not possible.

(2) Core breaks cannot be matched, accurate footage measurements not possible.

Procedure No. RMRS/OPS-PRO.101

Revision 0

Date effective: 12/31/98

Page 27 of 28

PAGE 1 OF 2

Sample Type: Dual Tube

Project No.: GR210100

APPROVAL

DATE _____

1.3 - 10.8 Clayey gravel w/ sand
lt olive brown 2.5 y 5/6, coarse,
poorly graded, subround, drs.

Page 27 of 28

ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE BOREHOLE LOG

Borehole Number: C039-039
 Location - North: Surveyed East: Surveyed
 Date: 3/1/05
 Geologist: A. Pacheco (3P) Z: TUGA
 Drilling Equip.: Power Probe

Surface Elevation: Surveyed
 Area: 903 Pad
 Total Depth: _____
 Company: URS Project No.: GR210100
 Sample Type: Dual Tube

RMRS LOGGING SUPERVISOR
 APPROVAL _____

DATE _____

TOP POSITION OF CORE IN BOX	TOP POSITION OF INTERVAL	FEET OF CORE IN INTERVAL FIELD MEASUREMENT	SAMPLE NUMBER	FRACURE ANGLE	STRESS ANGLE	GRANULE DISTRIBUTION	USCS SYMBOL	DEPTH IN FEET	LOG LITHOLOGY	SAMPLE DESCRIPTION
			10.0				GC	10		
			12.0				CL	11		10.8 - 12.5 Clay, 1+ brownish gray 2.5 Y 6/2, st. ff, slightly moist, w/ sparse clay siltite, subround, fine.
	12.0	3.6 4.0	12.0				GC	12		
								13		12.5 - 16.6 Clayey gravel w/ sand, strong brown 2.5 YR 5/8, coarse poorly graded, subround, dry.
								14		
								15		
								16		
	16.0	3.5 4.0	16.8 16.6 17.1					17		16.6 - 19.5 Clay, olive yellow 2.5 Y 6/8 mottled with gray 2.5 Y 6/1, very stiff, slightly moist. [WEATHERED BEDROCK]
								18		
								19		
								20		19.5 - 20.0 TD NO RECOVERY

NOTES: General: USCS is modified for this log as follows:
 Materials amounts are estimated by % volume instead of % weight.
 (1) Badly broken core, accurate footage measurements not possible.
 (2) Core breaks cannot be matched, accurate footage measurements not possible.

Procedure No. RMRS/OPS-PRO.101
 Revision 0
 Date effective: 12/31/98
 Page 27 of 28

**Groundwater IM/IRA - 903 Pad VOC
Investigation**

Area 5

Borehole Logs

ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE BOREHOLE LOG

PAGE 1 OF 2

Borehole Number: CP37-073Surface Elevation: SurveyedLocation - North: Surveyed East: SurveyedArea: 903 PadDate: 3/3/05Total Depth: 20'Geologist: A PachecoCompany: URS

Project No.: _____

Drilling Equip.: PowerProbeSample Type: Dual Tube

RMRS LOGGING SUPERVISOR

APPROVAL _____

DATE _____

TOP/BOTTOM OF CORE IN BOX	TOP/BOTTOM OF INTERVAL FEET OF CORE IN INTERVAL MEASUREMENT	SAMPLE NUMBER	FRACTURE ANGLE	SEDDING ANGLE	GRAIN SIZE DISTRIBUTION	USCS SYMBOL	DEPTH IN FEET	SOIL LITHOLOGIC LOG	SAMPLE DESCRIPTION
		0.4 A vac				Gm			0-0.4 Sand-silt-clay mixture with gravel [Fill] dark reddish brown SYR 3/2, poorly graded clay-soft, gravel-quartzite/granitic (0.1 in) subangular
		2.4 B vac				Gc	1		Clayey Sandy Gravel yellowishred SYR 5/6 to reddish brown gravel-subang. quartzite SYR 5/3 (0.1 in) poorly graded sand-subrounded, med.-coarse quartz slightly moist
4.0	4.0	4.0 C vac					2		
		4.0 C vac					3		
		4.0 C vac					4		4-4.5. Stough ACP 3-3-05
		4.0 C vac					5		4.0-6.4 Clayey Sandy Gravel as above ACP 3-3-05
		6.0 C vac					6		
		6.4 C vac					7		6.4-8.0 No Recovery
8.0	8.0	2.4					8		8.0-12.0 Clayey Sandy Gravel as above
							9		
							10		

NOTES: General: USCS is modified for this log as follows:

Materials amounts are estimated by % volume instead of % weight.

(1) Badly broken core, accurate footage measurements not possible.

(2) Core breaks cannot be matched, accurate footage measurements not possible.

Procedure No. RMRS/OPS-PRO.101

Revision 0

Date effective: 12/31/98

Page 27 of 28

ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE BOREHOLE LOG

PAGE 2 OF 2Borehole Number: CP37-073Surface Elevation: surveyedLocation - North: Surveyed East: SurveyedArea: 903 PadDate: 3/3/05Total Depth: 20.0'Geologist: A PachecoCompany: URS

Project No.: _____

Drilling Equip.: Power ProbeSample Type: dual tube

RMRS LOGGING SUPERVISOR

APPROVAL _____

DATE _____

TOP/BOTTOM OF CORE IN BOX	TOP/BOTTOM OF INTERVAL	FEET OF CORE IN INTERVAL MEASUREMENT	SAMPLE NUMBER	FRACTURE ANGLE	DIPPING ANGLE	GRANULE DISTRIBUTION	USCS SYMBOL	DEPTH IN FEET	SOIL/ LITHOLOGIC LOG	SAMPLE DESCRIPTION
							GC			10.0-12.0 See previous page
12.0	12.0	4.0						11		
								12		12.0 Clayey Sandy Gravel see previous page
								13		
								14		
								15		
16.0	16.0	4.0						16		
								17		
								18		17.9-18.1 Sandy Clay with Gravel 50% less Gravel, 10% more clay
								19		18.1-19.2 Gravelly clay with sand 5% less sand, 5% more Gravel
			18.7							
			D VOL							
			19.2							
			E VOL							
20.0	20.0	4.0	19.7					20		19.2-20.0 Silty Sandstone dark reddish gray 5YR 4/2 moderately strong, completely weathered 20.0 fine subrounded sand

NOTES: General: USCS is modified for this log as follows:

Materials amounts are estimated by % volume instead of % weight.

(1) Badly broken core, accurate footage measurements not possible.

(2) Core breaks cannot be matched; accurate footage measurements not possible.

Procedure No. RMRS/OPS-PRO.101

Revision 0

Date effective: 12/31/98

Page 27 of 28

50

ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE BOREHOLE LOG

PAGE 2 OF 2

Borehole Number: CP 39-064Surface Elevation: SURVEYLocation - North: 749247.9 East: 208579.2Area: 900-11 (903 Pad)Date: 3/9/05

Total Depth: _____

Geologist: Z TutaCompany: URSProject No.: GR210100Drilling Equip.: AMS POWERPROBE 9620 TITANSample Type: AMS DUAL TUBE

RMRS LOGGING SUPERVISOR

APPROVAL _____

DATE _____

TOP/BOTTOM OF CORE IN BOX	TOP/BOTTOM OF INTERVAL	FEET OF CORE IN INTERVAL MEASUREMENT	SAMPLE NUMBER	FRACTURE ANGLE	DIPPING ANGLE	GRAIN SIZE DISTRIBUTION	USCS SYMBOL	DEPTH IN FEET	SOIL LITHOLOGIC LOG	SAMPLE DESCRIPTION
			C				GP	10		
			10.5							
			D				SC	11		
			11.5							
	12.0							12		
								13		
								14		
			14.0							
			E					15		
			15.2							
			F				CI	16		
			16.0	TD						
								17		
								18		
								19		
								20		

10.5 - 15.2
Clayey sand w/ gravel,
yellowish red 5YR 5/6,
medium, subangular,
poorly graded, feldspar
etc, slightly moist.

15.2 - 16.0
Sandy
light gray 5Y 7/1 mottled with
dusky yellow 2.5Y 6/8 stiff,
slightly moist, fine subangular sand
[WEATHERED BEDROCK]

NOTES: General: USCS is modified for this log as follows:

Materials amounts are estimated by % volume instead of % weight.

(1) Badly broken core, accurate footage measurements not possible.

(2) Core breaks cannot be matched, accurate footage measurements not possible.

Procedure No. RMRS/OPS-PRO.101

Revision: 0

Date effective: 12/31/98

Page 27 of 28

Area 5

ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE BOREHOLE LOG

PAGE 1 OF 3

Borehole Number: CQ37-086Location - North: Surveyed East: SurveyedDate: 3-2-05Geologist: A. PachecoDrilling Equip.: Power ProbeSurface Elevation: SurveyedArea: 903 PadTotal Depth: 22.0'Company: URS

Project No.: _____

Sample Type: dual tube

RMRS LOGGING SUPERVISOR

APPROVAL _____

DATE _____

TOP POSITION OF CORE IN BOX	INTERVAL OF TOP POSITION OF CORE IN BOX	MEASUREMENT OF CORE IN BOX	SAMPLE NUMBER	FRACURE ANGLE	SECOND ANGLE	GRAN SIZE DISTRIBUTION	USCS SYMBOL	DEPTH IN FEET	SOIL LITHOLOG LOG	SAMPLE DESCRIPTION
			0.9				GM			0-0.9 Sand-silt-clay mixture with gravel reddish brown SYR 4/3, coarse-med. sand, subrounded, quartz, [Fill]
			A voc				GC	1		0.9- Clayey Gravel with trace sand pinkish gray SYR 6/2 gravel-quartzite, subangular (0.1 in) poorly-graded dk gray SYR 4/1 slightly moist
			2.9 B voc					2		
			2.9 B voc					3		
4.0	4.0	1.6						4		granitic/quartz sand <5% dark reddish brown 2 SYR 3/4 subrounded, med.
			4.9 C voc					5		
								6		
								7		
8.0	8.0	4.0						8		Clayey Gravel as above
								9		
								10		

NOTES: General: USCS is modified for this log as follows:

Materials amounts are estimated by % volume instead of % weight.

(1) Badly broken core, accurate footage measurements not possible.

(2) Core breaks cannot be matched, accurate footage measurements not possible.

Procedure No. RMRS/OPS-PRO.101

Revision 0

Date effective: 12/31/98

Page 27 of 28

ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE BOREHOLE LOG

PAGE 2 OF 3Borehole Number: CQ37-086Location - North: Surveyed East: SurveyedDate: 3-2-05Geologist: A. PachecoDrilling Equip.: Power ProbeSurface Elevation: SurveyedArea: 903 Pa1Total Depth: 22.0'Company: URS

Project No.: _____

Sample Type: dual tubeRMRS LOGGING SUPERVISOR
APPROVAL _____

DATE _____

TOP POSITION OF CORE IN BOX	TOP POSITION OF INTERVAL	FEET OF CORE INTERVAL (FIELD MEASUREMENT)	SAMPLE NUMBER	FRAC	SECTING ANGLE	GRAIN SIZE DISTRIBUTION	USCS SYMBOL	DEPTH IN FEET	LOG	SAMPLE DESCRIPTION
			11.1				GC			Clayey Gravel as above with trace sand
			11.2					11		
12.0	12.0	4.0	12.3					12		
			12.5					13		12.3 PID=0.3ppm, Fe-Dx staining red 2.5YR 4/6 coarse sand, subrounded slightly moist offset 5' due to refusal.
13.5	13.5	1.5						14		
								15		Clayey Gravel as above
16.0	16.0	2.5						16		16.0-16.5 No Recovery
							GC	17		16.5-17.0 Clayey Gravel as above grading into
							CL	18		17.0-18.7 Gravely clay Sandy clay gravel-0.02 to 0.1 in, subangular quartzite sand-coarse to medium, subrounded, quartz clay-stiff, slightly moist well-graded
			18.2					19		18.7-20.0 Silty Sandstone with trace gravel brown 2.5YR 5/3 to yellowish brown 10YR 5/4 mod. strong fine, subrounded quartz slightly moist completely weathered
20.0	20.0	3.5	19.2					20		

NOTES: General USCS is modified for this log as follows:

Materials amounts are estimated by % volume instead of % weight.

(1) Badly broken core, accurate footage measurements not possible.

(2) Core breaks cannot be matched, accurate footage measurements not possible.

Procedure No. RMRS/OPS-PRO.101

Revision 0

Date effective: 12/31/98

Page 27 of 28

ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE BOREHOLE LOG

PAGE 3 OF 3Borehole Number: CQ37-086Location - North: Surveyed East: SurveyedDate: 3-20-85Geologist: A. PachecoDrilling Equip.: Power ProbeSurface Elevation: SurveyedArea: 903 PadTotal Depth: 22.0'Company: URS

Project No.: _____

Sample Type: dual tubeRMRS LOGGING SUPERVISOR
APPROVAL _____

DATE _____

TOP OF CORE IN BOX	TOP OF CORE INTERVAL	FEET OF CORE IN INTERVAL MEASUREMENT	SAMPLE NUMBER	FRACURE ANGLE	BEDDING ANGLE	GRAIN SIZE DISTRIBUTION	USCS SYMBOL	DEPTH IN FEET	LOG LITHOLOGIC	SAMPLE DESCRIPTION
			20.0							
			20.2							
22.0	22.0	2.0						21		20.0-20.2 Coarse Sand subangular, quartz, moist PID=1 ppm
								22		20.2-22.0 Silty Sandstone brown 7.5YR 5/3 to yellowish brown to grayish brown 10YR 5/4 mod. strong 10YR 5/2 fine subrounded quartz sand TD=22' completely weathered
								23		
								24		
								25		
								26		
								27		
								28		
								29		
								30		

NOTES: General: USCS is modified for this log as follows:

Materials amounts are estimated by % volume instead of % weight.

(1) Badly broken core, accurate footage measurements not possible.

(2) Core breaks cannot be matched, accurate footage measurements not possible.

Procedure No. RMRS/OPS-PRO.101

Revision 0

Date effective: 12/31/98

Page 27 of 28

ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE BOREHOLE LOG

PAGE 1 OF 3

Borehole Number: CR37-086Location - North: Surveyed East: SurveyedDate: 3-2-05Geologist: A. PachecoDrilling Equip.: PowerProbeSurface Elevation: SurveyedArea: 903 PadTotal Depth: 22.0'Company: URS

Project No.: _____

Sample Type: dual tubeRMRS LOGGING SUPERVISOR
APPROVAL _____

DATE _____

TOP/BOTTOM OF CORE IN BOX	TOP/BOTTOM OF INTERVAL	FEET OF CORE HANDLING FIELD MEASUREMENT	SAMPLE NUMBER	FRASURE ANGLE	SECOND ANGLE	GRAIN SIZE DISTRIBUTION	USCS SYMBOL	DEPTH IN FEET	SOIL/ LITHOLOGIC LOG	SAMPLE DESCRIPTION
			0.9 A voc				GM			0-0.9. Sand-silt-clay mixture with gravel reddish brown SYR 4/3, coarse-med. sand, subrounded, quartz, [Fill]
			2.9 AP 3.2 OC				GC	1		0.9- Clayey Gravel with trace sand pinkish gray SYR 6/2 gravel-quartzite, subangular (0.1 in) poorly-graded dk gray SYR 4/1 slightly moist
			2.9					2		
			B voc					3		
4.0	4.0	1.6						4		granitic/quartz sand <5% dark reddish brown 2.5 SYR 3/4 subrounded, med.
			4.9 AP 3.2 OC					5		
			C voc					6		
								7		
								8		
8.0	8.0	4.0						9		Clayey Gravel as above
								10		

NOTES: General: USCS is modified for this log as follows:

Materials amounts are estimated by % volume instead of % weight.

(1) Badly broken core, accurate footage measurements not possible.

(2) Core breaks cannot be matched, accurate footage measurements not possible.

Procedure No. RMRS/OPS-PRO.101

Revision 0

Date effective: 12/31/98

Page 27 of 28

ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE BOREHOLE LOG

PAGE 2 OF 3

Borehole Number: CQ37-086Location - North: Surveyed East: SurveyedDate: 3-2-05Geologist: A. PachecoDrilling Equip.: Power ProbeSurface Elevation: SurveyedArea: 903 PadTotal Depth: 22.0'Company: URS

Project No.: _____

Sample Type: dual tubeRMRS LOGGING SUPERVISOR
APPROVAL _____

DATE _____

TOP/BOTTOM OF CORE IN BOF	TOP/BOTTOM OF INTERVAL	FEET OF CORE IN INTERVAL (FIELD MEASUREMENT)	SAMPLE NUMBER	FAULTURE ANGLE	SECOND ANGLE	GRAIN SIZE DISTRIBUTION	USCS SYMBOL	DEPTH IN FEET	LITHOLOGIC LOG	SAMPLE DESCRIPTION
			11.1 bvol				GC	11		Clayey Gravel as above with trace sand
			11.2					12		
12.0	12.0	4.0	12.3 E Vol					13		12.3 PID=0.3ppm, Fe-Dx staining red 2.5YR 4/6 coarse sand, subrounded slightly moist offset 5' due to refusal.
			12.5					14		
13.5	13.5	1.5						15		Clayey Gravel as above
								16		16.0-16.5 No Recovery
16.0	16.0	2.5					GC	17		16.5-17.0 Clayey Gravel as above grading into fine 2.5YR 4/6 17.0-18.7 Gravelly clay Sandy clay gravel-0.02 to 0.1 in, subangular quartzite sand-coarse to medium, subrounded, quartz clay-stiff, slightly moist well-graded
			18.2 Fvol				CL	18		
			18.7 Gvol					19		18.7-20.0 Silty Sandstone with trace gravel brown 2.5YR 5/3 to yellowish brown 10YR 5/4 mod. strong fine, subrounded quartz slightly moist completely weathered
			19.2					20		
20.0	20.0	3.5								

NOTES: General: USCS is modified for this log as follows:

Materials amounts are estimated by % volume instead of % weight.

(1) Badly broken core, accurate footage measurements not possible.

(2) Core breaks cannot be matched, accurate footage measurements not possible.

Procedure No. RMRS/OPS-PRO.101

Revision 0

Date effective: 12/31/98

Page 27 of 28

ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE BOREHOLE LOG

PAGE 3 OF 3Borehole Number: CQ37-086Location - North: Surveyed East: SurveyedDate: 3-2-05Geologist: A. PachecoDrilling Equip.: Power ProbeSurface Elevation: SurveyedArea: 903 PadTotal Depth: 22.0'Company: URS

Project No.: _____

Sample Type: dual tube

RMRS LOGGING SUPERVISOR

APPROVAL _____

DATE _____

TOP POSITION OF CORE IN BOX	TOP POSITION OF INTERVAL	FEET OF CORE IN INTERVAL FIELD MEASUREMENT	SAMPLE NUMBER	FRACTURE ANGLE	SEEDING ANGLE	GRAIN SIZE DISTRIBUTION	USCS SYMBOL	DEPTH IN FEET	RMRS/ LITHOLOGIC LOG	SAMPLE DESCRIPTION
			20.0							
			20.2							20.0-20.2 Coarse Sand subangular, quartz, moist PID=1 ppm
								21		20.2-22.0 Silty Sandstone brown 7.5YR 5/3 to yellowish brown to grayish brown 10YR 5/4 mod. strong 10YR 5/2
22.0	22.0	2.0						22		fine subrounded quartz sand completely weathered TD=22'
								23		
								24		
								25		
								26		
								27		
								28		
								29		
								30		

NOTES: General: USCS is modified for this log as follows:

Materials amounts are estimated by % volume instead of % weight.

(1) Badly broken core, accurate footage measurements not possible.

(2) Core breaks cannot be matched, accurate footage measurements not possible.

Procedure No. RMRS/OPS-PRO.101

Revision 0

Date effective: 12/31/98

Page 27 of 28

ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE BOREHOLE LOG

PAGE 1 OF 2

Borehole Number: CQ37-087Location - North: Surveyed East: SurveyedDate: 3-2-05Geologist: A PachecoDrilling Equip.: Probe ProbeSurface Elevation: SurveyedArea: 903 PadTotal Depth: 20'Company: VRS

Project No.: _____

Sample Type: Dual Tube

RMRS LOGGING SUPERVISOR

APPROVAL _____

DATE _____

TOP POSITION OF CORE IN SOLE	TOP POSITION OF INTERVAL	FEET OF CORE IN INTERVAL MEASUREMENT	SAMPLE NUMBER	FRACURE ANGLE	SEEDING ANGLE	GRAIN SIZE DISTRIBUTION	USCS SYMBOL	DEPTH IN FEET	SOIL LITHOLOGIC LOG	SAMPLE DESCRIPTION
			0-3				GM			0-0.3 Sand-silt-clay mixture with gravel [Fill] dark reddish brown SYR 3 1/2
			A vol + EPA split				Gc	1		0.3 - poorly-graded, slightly moist Clayey Gravel
			2-3					2		1/4 gray 10YR 7/2 poorly-graded, quartzite - subangular clay - soft, slightly moist (0.1 in)
			B vol + EPA split					3		
4.0	4.0	4.0	4-5					4		
			C vol + EPA split					5		
			6-10					6		
								7		
								8		
8.0	8.0	4.0						9		
								10		

NOTES: General: USCS is modified for this log as follows:

Materials amounts are estimated by % volume instead of % weight.

(1) Badly broken core, accurate footage measurements not possible.

(2) Core breaks cannot be matched, accurate footage measurements not possible.

Procedure No. RMRS/OPS-PRO.101

Revision 0

Date effective: 12/31/98

Page 27 of 28

PAGE 1 OF 2

Project No.: _____

Sample Type: Dual Tube

APPROVAL

DATE _____

Page 27 of 28

ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE BOREHOLE LOG

PAGE 1 OF 2Borehole Number: CQ37-087Location - North: Surveyed East: SurveyedDate: 3-2-05Geologist: A PachecoDrilling Equip.: Probe ProbeSurface Elevation: SurveyedArea: 903 PadTotal Depth: 20'Company: VRSSample Type: Dual Tube

Project No.: _____

RMRS LOGGING SUPERVISOR
APPROVAL _____

DATE _____

TOP POSITION OF CORE IN BOX	TOP POSITION OF INTERVAL	TEST OF CORE IN INTERVAL FIELD MEASUREMENT	SAMPLE NUMBER	FRACURE ANGLE	SEEDING ANGLE	GRAIN SIZE DISTRIBUTION	USCS SYMBOL	DEPTH IN FEET	SRU LITHOLOG LOG	SAMPLE DESCRIPTION
			0.3				GM			0-0.3 sand-silt-clay mixture with gravel [Fill] dark reddish brown SYR 3 1/2
			A voc + EPA split				Gc	1		0.3 - poorly-graded, slightly moist Clayey Gravel lt gray 10YR 7/2 poorly-graded, quartzite - subangular clay-soft, slightly moist (0.1 in)
			2.3					2		
			B voc + EPA split					3		
4.0	4.0	4.0	4.3					4		
			C voc + EPA split					5		
			6.0					6		
								7		
8.0	8.0	4.0						8		
								9		
								10		

NOTES: General: USCS is modified for this log as follows:

Materials amounts are estimated by % volume instead of % weight.

(1) Badly broken core, accurate footage measurements not possible.

(2) Core breaks cannot be matched, accurate footage measurements not possible.

Procedure No. RMRS/OPS-PRO.101

Revision 0

Date effective: 12/31/98

Page 27 of 28

ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE BOREHOLE LOG

PAGE 2 OF 2Borehole Number: CQ37-087Location - North: Surveyed East: SurveyedDate: 3-2-05Geologist: ApacheDrilling Equip.: Porter ProbeSurface Elevation: SurveyedArea: 903 PadTotal Depth: 20'Company: URS

Project No.: _____

Sample Type: Dual Tube

RMRS LOGGING SUPERVISOR

APPROVAL _____

DATE _____

TOP OF CORE OF CORE IN BOX	TOP OF CORE OF INTERVAL	FEET OF CORE IN INTERVAL MEASUREMENT	SAMPLE NUMBER	FRACTURE ANGLE	SEEDING ANGLE	GRAIN SIZE DISTRIBUTION	USCS SYMBOL	DEPTH IN FEET	SRU/ LITHOLOGIC LOG	SAMPLE DESCRIPTION
							GC			Clayey Gravel as above
								11		
12.0	12.0	4.0						12		
								13		
								14		
								15		
16.0	16.0	4.0						16		
								17		
			17.3				CL			17.2 - 17.8 Gravelly clay with sand
			Dvac	+ EPA						5% less Gravel, 0.05 in subangular
			17.8	split						stiff, slightly moist fine, subrounded quartzite
			Evac	+ EPA						17.8 - 20.0 Silty Sandstone sand
			18.3	split				18		
								19		mod. strong
										Completely weathered
								20		TD=20.0'

NOTES: General: USCS is modified for this log as follows:

Materials amounts are estimated by % volume instead of % weight.

(1) Badly broken core, accurate footage measurements not possible.

(2) Core breaks cannot be matched, accurate footage measurements not possible.

Procedure No. RMRS/OPS-PRO.101

Revision 0

Date effective: 12/31/98

Page 27 of 28

October 10, 2005

Appendix B

Contact Record for Completion of HRC Enhancements at the 903 Pad and Ryan's Pit areas

ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE ER REGULATORY CONTACT RECORD

Date/Time: September 9, 2005

Site Contact(s): Annette Primrose, Karen Wiemelt, Norma Castaneda
Phone: 303 994-2761 303 966-9883 303-966-4226

Regulatory Contact: Larry Kimmel Carl Spreng Harlen Ainscough
Phone: 303 312-6659 303 692-3358 303 692-3337
Agency: EPA CDPHE

Purpose of Contact: Completion of HRC Enhancements at the 903 Pad and Ryan's Pit areas

Discussion

As described in the Interim Measure/Interim Remedial Action for Groundwater at Rocky Flats Environmental Technology Site (GW IM/IRA)(DOE, 2005), amendments were to be added directly into the subsurface downgradient of the remedial action areas for the 903 Pad and Ryan's Pit area to enhance or improve the naturally occurring biodegradation of VOCs and enhance groundwater quality. Downgradient of the Ryan's Pit remedial action, the material was to be inserted into the subsurface through Geoprobe boreholes at an appropriate grid spacing to cover the area with the highest residual contaminant concentrations. Insertion of amendments at Ryan's Pit and the 903 Pad area was completed in accordance with the GW IM/IRA as described below.

Ryan's Pit Area

Ten insertion points were placed within an area along the south wall of the previous source removal action at the south wall of the former Ryan's Pit excavation, where the highest residual contamination was present. Insertion of Hydrogen Release Compound (HRC)-X™ was initiated on June 20, 2005 and completed on July 6, 2005. HRC-X™ is an extended release form of HRC®, is made with a proprietary, environmentally safe, polylactate ester formulated for slow release of lactic acid upon hydration to biodegrade chlorinated solvents. The ten points were completed to a depth of 9 feet using a Geoprobe™ as shown on Figure 1 and a total of 510 pounds of HRC-X™ was inserted. The area was checked after material insertion, no subsidence was noted. Upon completion, the area was revegetated.

903 Pad Area

In the area of the 903 Pad remedial action, material was to be inserted into the subsurface in three arcs through the eastward draining paleochannel that is the primary groundwater flow path for this area. These arcs were located where there is the highest possibility of residual contamination and groundwater flow. This will enhance groundwater quality in this area by creating a reducing environment that will assist with the degradation of VOCs. The results of the investigation that determined the area of the highest residual contamination are presented separately.

Insertion of the amendment at the 903 Pad started on June 30, 2005 and was completed on August 12, 2005. A combined 5,710 pounds of HRC® and HRC-X™ were placed into insertion points as shown in the attached figure (Figure 2). The insertion points were placed along a series of three arcs using either a rotary drill rig or a Geoprobe™ along the major groundwater flow path

54/51

through the 903 Pad area. Each hole was filled from bedrock or below to at least the bottom of the clean fill dirt brought in after the 903 Pad remedial action was completed. For insertion points where the rotary drill rig was used, a larger diameter hole was present. At these locations, the clean drill cuttings were mixed with HRC® and HRC-X™ during filling of the insertion points. The insertion points were all inspected after material insertion was completed. The material did not subside over time and no additional HRC® was inserted. After completion of material insertion, drilling equipment was demobilized and the area was revegetated.

Contact Record Prepared By: Annette Primrose

Required Distribution:

M. Aguilar, USEPA
H. Ainscough, CDPHE
J. Berardini, K-H
B. Birk, DOE-RFPO
L. Brooks, K-H ESS
G. Carnival, K-H RISS
N. Castaneda, DOE-RFPO
C. Deck, K-H Legal
N. Demos, SSOC
S. Garcia, USEPA
S. Johnson, K-H ESS
M. Keating, K-H RISS
L. Kimmel, USEPA

D. Kruchek, CDPHE
S. Nesta, K-H RISS
A. Primrose, K-H RISS
M. Roy, DOE-RFPO
R. Schassburger, DOE-RFPO
S. Serreze, K-H RISS
D. Shelton, K-H ESS
C. Spreng, CDPHE
S. Surovchak, DOE-RFPO
J. Walstrom, K-H RISS
K. Wiemelt, K-H RISS
C. Zahm, K-H Legal

Additional Distribution:

C. Dayton, K-H ESS
I. Paton, K-H ESS

